FILE COPY.

Office Supreme Court, U. S.
FILED
FEB 24 1914
JAMES D. MAHER
CLERK

NO. 1, ORIGINAL.

In the Supreme Court of the United States

OCTOBER TERM, 1913.

THE STATE OF GEORGIA, Complainant,
vs.
THE TENNESSEE COPPER COMPANY
and
THE DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED, Defendants.
IN EQUITY.

BRIEF AND STATEMENT OF FACTS, IN OPPOSITION TO COMPLAINANT'S MOTION TO SET ASIDE THE CONTINUANCE ENTERED IN THIS CASE ON OCTOBER 20, 1913, AND TO ENTER A FINAL DECREE ON THE OPINION HANDED DOWN ON MAY 13, 1907.

INDEX.

	Page
Statement of the Case	1
Order of Continuance Should Not be Set Aside	3
Inequitable for Georgia to Demand Final Decree	3
Intention of Court When Granting Defendants Extension of Time to Investigate Subsequent Dispute, if Any Should Arise	5
In Action to Enjoin Nuisance Decree of Injunction Disallowed if Nuisance Voluntarily Abated During Pendency of Suit	7
Nunc Pro Tunc Order Within Discretion of Court	12
If Not Intention of Court When Opinion Handed Down to Again Consider the Facts Before Entering Decree, Subsequent Action of Parties Make Proper Such Course	12
Defendant Ducktown Company Now Eliminates all Noxious Elements from Smoke	13
Decree Submitted by Complainant Goes Beyond Requirements of the Law	15
Decree Submitted Will be Continuing Menace to Defendant's Existence	18

APPENDIX.

Exhibit A—Commission of W. M. Bowron by the Governor of Georgia	20
Exhibit B—Like Commission from the Attorney General of Georgia	20
Exhibit C—Verified Copy of the Report of W. M. Bowron	21
Exhibit D—Affidavit of W. M. Bowron	47
Exhibit E—Report of Peter S. Gilchrist and J. M. McCandless	48
Exhibit F—Affidavit of Peter S. Gilchrist	55
Exhibit G—Affidavit of S. M. Bain	56
Exhibit H—Affidavit of C. W. Renwick	60
Exhibit I—Affidavit of W. B. Miller	62
Exhibit J—Judgment of the Court in Consolidated Causes	63

CASES CITED.

Arizona Copper Co. v. Gillespie, 230 U. S., 46, 55, 57 11
Attorney General v. Delaware & Bound Brook R. Co., 27 N. J. Eq. (12 C. E. Green), 1 16
23 CYC., 840 12
29 CYC., 1252 5
Georgia v. Tennessee Copper Co., 206 U. S., 230, 237, 238.. 12
1 High on Injunctions, (4 Ed.), Section 740 14
1 High on Injunctions, (4 Ed.), Section 752 7
1 High on Injunctions, (4 Ed.), Section 760 .....14. 16
King v. Morris & Essex R. Co., 18 N. J. Eq., (3 C. E. Green), 397, 399, 400 10
McCarthey v. Gaston Ridge Mill, etc. Co., 144 California, 542, 546 9
Mitchell v. Overman, 13 Otto, 62 12
Mississippi & Missouri R. Co. v. Ward, 2 Black, 485, 495... 17
Missouri v. Illinois, 200 U. S., 496 .....5. 16
Perry v. Howe Co-operative Creamery Co., 125 Ia., 415, 417 8
Trulock v. Merte, 72 Ia., 510, 513 7
Valentine v. Webb, 84 Mich., 38, 46, 49 5

In the Supreme Court of the United States

OCTOBER TERM, 1913.

No. 1—Original.

THE STATE OF GEORGIA,
Complainant
vs.
THE TENNESSEE COPPER COMPANY
AND
THE DUCKTOWN SULPHUR, COPPER
AND IRON COMPANY, LIMITED
Defendants

BRIEF AND STATEMENT OF FACTS, IN OPPOSITION TO COMPLAINANT'S MOTION TO SET ASIDE THE CONTINUANCE ENTERED IN THIS CASE ON OCTOBER 20, 1913, AND TO ENTER A FINAL DECREE ON THE OPINION HANDED DOWN ON MAY 13, 1907.

This case was heard on affidavits on February 25th and 26th, 1907, and an opinion was handed down on May 13, 1907, wherein the Court found in the most general terms, that defendants were committing a public nuisance in the State of Georgia, by emitting from their furnaces used in smelting ores, noxious fumes and gases, but in order to allow a reasonable time to the defendants to complete the efforts they were

making to stop the fumes, the Court postponed the entrance of a final decree till the October Term, 1907. The following entry appears upon the Minutes of this Court for that term:

> "Mr. John C. Hart, of counsel for the complainant, submitted to the consideration of the court a motion to postpone the entry of the final decree in this case.
>
> "October 21, 1907.
>
> "On consideration of the motion to postpone the entry of final decree in this cause, it is now here ordered by the Court that the time to present the form of the final decree to be entered herein, be, and the same is hereby, enlarged as counsel may be advised, without prejudice, and on due notice.
>
> "October 28, 1907."

On August 13, 1913, the Legislature of the State of Georgia passed a resolution, wherein after reciting a proposed agreement between the State of Georgia and the Tennessee Copper Company, it is further recited: "that the Governor be and he is hereby authorized and directed to enter into an agreement or stipulation with the Ducktown Sulphur, Copper & Iron Company (Limited), for the same length of time and under the same terms, conditions and limitations as are mentioned and provided by said contract with the Tennessee Copper Company, and with the exception that, the amount to be deposited by the said Ducktown Copper & Iron Company (Limited) for the arbitration of claims, shall be the annual sum of eight thousand, five hundred ($8,500) dollars, to be deposited and distributed under the same terms and conditions and with the same provisions and limitations as are provided in said contract with Tennessee Copper Company, as set out in said above mentioned resolutions.

"*Be it Further Resolved,* That in the event the said Ducktown Sulphur, Copper & Iron Company (Limited) shall fail, refuse or decline to enter into such contract with the State of Georgia, and to deposit said fund annually as above set out, the Governor is authorized and directed to make prompt application for final decree of injunction against said defendant, Ducktown Sulphur, Copper & Iron Company (Limited) in said cause in the United States Supreme Court."

On the 20th day of October, 1913, on the joint application of the State of Georgia and the defendant Tennessee Copper Company, that the cause be continued as to said company, the following entry was made:

"On consideration of the motion for leave to file the stipulation of counsel for the respective parties herein, and that this cause be continued until the October Term, 1916.

"It is now here ordered by the Court that said motion be, and the same is hereby, granted."

Complainant now moves that said order of continuance be set aside as to the defendant Ducktown Sulphur, Copper & Iron Company, and that the form of decree submitted to the Court be entered.

This defendant, the Ducktown Company, opposes said motion upon the following grounds:

I.

The cause was continued as to all parties and at the instance of the complainant, and no sufficient reason is shown why this order should be set aside and a final decree now entered.

The State of Georgia has not furnished this defendant with any document wherein it is claimed or even suggested that at the present time it is, or any of its citizens are, suffering the least injury or inconvenience in consequence of the manner in which defendant's plant is being operated. Nor, is it claimed or suggested that defendant is *threatening* to so operate its plant as to occasion any injury or inconvenience to the State of Georgia or any of its citizens.

Before setting aside the continuance, it certainly should be shown that it will work some injury to the State of Georgia or some of its citizens. There is no reason why the Court should re-instate the case upon the docket of the present term and burden itself with its consideration, unless it is shown that some benefit will arise therefrom.

II.

It is inequitable for the State of Georgia now to demand a final decree against this defendant.

The hearing on February 25th and 26th, 1907, was on affidavits, and it was realized by the Court, as appears from the language of Mr. Justice Holmes, in the opinion prepared by him, that this method of ascertaining the facts was unsatisfactory. However, in view of that adjudication it cannot now be questioned that defendant, along with its co-defendant, the Tennessee Copper Company, was at that time in some respect committing a nuisance in the State of Georgia; but the Court did not undertake to point out the extent of that nuisance or precisely in what acts it consisted. Manifestly, this was not done because it was believed that defendants were honestly endeavoring to remedy the situation, in which effort it was thought they would succeed, and time was given that they might make a thorough test of the method of manufacture which they hoped would render the smoke emitted innocuous. In this delay the State of Georgia was gracious enough to concur, and this defendant appreciates both the action of the Court and the concurrence therein of the State of Georgia.

At the October Term, 1907, complainant made application to the Court that the entrance of a final decree be further postponed, without any limitation of time as to when it might be presented, and an order in accordance with the application was entered, and *for seven years* this order has been acquiesced in. And certainly the State of Georgia, by so doing, has recognized that its rights are not being violated, and its citizens are not being injured or annoyed by this defendant to any material extent.

Defendant has acted in the best of faith in endeavoring to extract from its smoke all fumes which could possibly cause any inconvenience or injury in the State of Georgia, and it verily believes that it has fully accomplished the result intended; and hence it refuses to pay over to the plaintiff, without a hearing by this Court, the sum demanded by it or any other sum. When this court shall say it is not conforming strictly to the law in operating its plant and is encroaching upon the rights of the State of Georgia or its citizens, it will willingly adjust its operations to such order as the Court shall make. But it does not believe it just that it should be required to pay

any sum of money until there shall be a proper determination that it is legally liable therefor. And it respectfully submits that it is inequitable upon the part of complainant to present to this defendant the alternative that it shall pay for distribution among certain of its citizens $8,000.00, or any other sum, per annum, without an adjudication that they are entitled thereto, or that a drastic decree against it will be demanded of this Court, based upon conditions found to exist *seven years* ago.

III.

Decrees enjoining the further commission of a nuisance must be specific in their terms; and it was the intention of this Court, when it granted time for the defendants to change their methods of operation so as to conform to the law, that if a dispute should arise between plaintiff and defendants or either of them as to the efficacy of the method then being tested, such dispute should be submitted to the Court for determination.

While in the opinion handed down it was not said in precise language that it was the intention of the Court to examine into the changed conditions, yet in view of the well recognized principles of law governing cases of this character, and what was actually done, such intention should be implied.

A decree inhibiting the maintenance of a nuisance must be specific in its terms. It must not be broader than the facts warrant, and it must point out clearly what acts the defendant must do, or what he must refrain from doing. (29 Cyc., 1252.)

Valentine v. *Webb*, 84 Mich., 38-46-49, affords a good illustration of this rule. That was an action brought to enjoin the defendant from operating a slaughter house near the complainants' premises. The lower Court "did not order the defendant to cease using the place as a slaughter house altogether, but decreed that defendant refrain from using or employing the buildings and sheds erected on defendant's premises for the purpose of a slaughter house wherein to slaughter hogs *in such a way* as to be offensive to, or become a nuisance to, the complainants; and that defendant desist and refrain from using or employing the said enclosure or building for the purpose of confining therein quantities of same or other animals *in such*

a way as to be offensive to and to be a nuisance to the complainants, or any of them; and that defendant desist and refrain from using said enclosure, or any part thereof, as a drying yard in which to dry hair or bristles taken from the slaughtered swine."

With reference to this decree the Supreme Court said:

> "The trouble with the decree is that it fails to point out specifically what defendant is required to do in order to comply with its requirements. To adjudge that defendant should so conduct his business as not to be offensive is to give him no rule of conduct which the law had not before prescribed. The decree should have specifically pointed out the things that defendant was required to do, and to refrain from doing, in order to abate the nuisance which the Court found to exist."

And the Court suggested what the terms of the decree should be.

In the present case, as above stated, the Court made no specific findings of facts, and gave no directions whatever as to what should be embraced in the decree, but contented itself with the general statement that "without any attempt to go into details immaterial to the suit, it is proper to add that we are satisfied, by a preponderance of evidence, that the sulphurous fumes cause and threaten damage on so considerable a scale to the forests and vegetable life, if not to health, within the plaintiff state, as to make out a case within the requirements of Missouri v. Illinois, 200 U. S., 496." And when reference is had to the opinion in the case of Missouri v. Illinois, it is found that while the general principles controlling such cases were stated, yet it was held that no nuisance existed, and there was no application of those principles to a particular state of facts.

In fact, it is impossible in this peculiar kind of case, to enter a decree which can define exactly *to what extent* the defendant can emit smoke. It is entirely different from enjoining one from operating a powder factory in a populous neighborhood, or from keeping a pig sty or a livery stable near a home, or directing nuisances of many other kinds be abated. There the defendant may know exactly what he is required

to do. He must remove his powder plant, or take his horse out of the stable, or remove his pigs from the sty. But here, the Court cannot direct the defendant to cease emitting *all* smoke. And what is the value in enjoining it from emitting noxious fumes which *materially*, or *substantially*, injure vegetation in Georgia, or pollute or render noxious its atmosphere, because it would leave open as a question of fact when such injury or pollution shall become material or substantial. Hence, the Court now should investigate that question of fact, and determine whether any *material* or *substantial* injury or inconvenience is now being committed. If there is not, no injunction should be entered. But if there is, the Court should point out in what such injury or inconvenience consists, and direct what shall be done to remedy them.

IV.

In actions brought to enjoin the maintenance of a nuisance, if the nuisance is abated at any time while the case is within the jurisdiction of the Court, and it is apparent that such abatement is in good faith, and that its resumption is not intended by the defendant, a decree of injunction will be denied.

This principle, which is well sustained by the following authorities, further necessitates the implication that the Court intended to give a further hearing in order to ascertain the exact facts existing when the decree should be entered.

In 1 High on Injunctions, (4 Ed.) Sec. 752, it is said:

> "And where defendant disclaims the intention of continuing the nuisance and is using due diligence for its removal, the injunction will be refused."

In *Trulock v. Merte*, 72 *Ia.*, 510-513, the complainant asked the Court to enjoin the defendant from using a house on an adjoining lot as a stable and pig sty and a place for other domestic animals and fowls, etc. After the action was brought, the defendants kept the premises free from all accumulations of manure, etc., and sold the horse which created the disturbance, but continued to keep two hogs in the shed, and the offensive smell created thereby was carried to complainant's house. With reference to the situation then existing, the Court said:

"The injunction is much broader than it should have been made. As stated above, defendants are inhibited by it from keeping upon their premises any domestic animals which would cause unusual noises, whereby plaintiff would be disturbed in the enjoyment of his home. They were also forbidden to allow the accumulation on their premises of any manure or offensive offal, which would have the effect to interfere with the comfortable or convenient use by plaintiff of his premises. That plaintiff is entitled to be protected from the annoyances forbidden by the injunction is certainly true. But a court of equity will interfere by injunction to protect a right, only when there is apparent danger that the right will be invaded. The Court will issue its mandate forbidding the doing of a particular act, only when it is shown that the party is about to do that act. And we do not find in the record any evidence of an intention by defendants to keep upon their premises animals of the kind prohibited by the injunction; or to permit the accumulation there of the materials prohibited."

Perry v. Howe Co-operative Creamery Company, 125 *Ia.*, 415-417, was a case in which an injunction was sought to restrain the defendants from contaminating a stream of water, and it was found that the facts were sufficient to make out a case, when the action was brought. But it was further found that the nuisance had been abated before the trial in the Court below. In considering whether or not, under such a condition, an injunction should be issued, the Court said:

"Was the trial court in error in refusing an injunction, the nuisance having been abated? We think this question must be answered in the negative. Equity will interfere through the medium of an injunction to restrain a private nuisance in two classes of cases only. First, when it is made to appear that the act threatened, if done, would be destructive, or that the injury would be irreparable; second, that repeated or continuous acts of wrong are done or threatened. It is the rule in all such cases that, when the legal remedy of an action at law for damages is adequate, a complaining party must be remitted to such remedy. In the first of the class of cases in which equity will interfere

it is upon the theory solely, that the injury, if accomplished, will be such that the personal or property rights threatened cannot be restored to an original condition, or cannot be compensated by money damages. In the second class of cases equity interferes, that a multiplicity of actions for damages may be avoided. Now, where the situation as shown to exist at the time of trial is such as that all the damage that may be expected has been done, and the conditions are such that no repetition of the acts or conduct complained of is to be apprehended, there can be no occasion for the entry of an injunctional decree. There is no longer anything to enjoin, and courts do not indulge in the idle task of formulating and entering decrees that cannot be made effective, because there is no state of facts to which the same can have application. Pomeroy's Equity, Section 1357."

McCarthey v. Gaston Ridge Mill, etc., Co., 144 *California*, 542-546, was an action brought to enjoin the defendant, who was engaged in mining and milling, from rendering a stream of water offensive to the smell, unwholesome, and unfit for watering his stock, and so charged with sand as to injure his land by depositing the same thereon. It appeared that the defendant had been committing the wrongs complained of up till the bringing of the action, and in fact, until after issues had been submitted to a jury with reference to the damages committed, and the jury had returned its verdict, but thereafter the defendant had constructed a ditch, which prevented a further pollution of the water. The Court below entered no injunctive order, but taxed defendant with the costs, and from this order the defendant appealed. As to the action of the Court in not entering an injunctive decree, the Supreme Court said:

"The Court has found that at the commencement of the action the defendant was maintaining the nuisance complained of, and that it continued to maintain it until a time subsequent to the submission of the issues to the jury. It has also found that after the commencement of the action the defendant constructed a ditch for the purpose of diverting the flow of water in a different direction, and that thereby it had ceased to pollute the plaintiff's land. As

the nuisance had been abated at the time the Court rendered its decision, the occasion for an order for its abatement had ceased, and for that reason it was proper to deny the plaintiff's application for an injunction."

In King v. Morris & Essex Railroad Company, 18 *N. J. Eq.*, (3 *C. E. Green*), 397-399-400, it was sought to enjoin the railroad company from operating locomotives which emitted sparks. It appeared, however, that the company was making reasonable efforts to equip its engines with spark arresters, which would probably prevent further damage, and in determining when an injunctive order should be entered, the Court said:

"But before an injunction will be issued, the court must be satisfied that not only has injury been done in the past, but that the defendants intend to continue it; and from the charges in the bill and affidavits, it seemed as if these defendants had determined to go on regardless of consequences. But the answer and proofs satisfactorily show that there never was any intentional or wanton disregard of the rights of the complainant, or other persons along the line of the road, by the company or its principal executive or ministerial officers. Their coal burners were constructed by the best makers, and on plans that on many other roads had been a sufficient guard against fires; and since they discovered that fires were caused by them, they have assiduously endeavored to contrive such appliances as will effectually prevent any extraordinary danger. There were some of their sixteen locomotives as originally constructed, those with the bonnet screen above the smoke-pipe, from which large pieces of ignited coal could by possibility be thrown by a strong application of the draft from the exhaust pipe. These engines may generally, and on most roads, be safe; but when used on heavy trains, or steep grades, that require the whole power of the engine, the driver will naturally use the power placed at his disposal to overcome the difficulty, and put on the full draft, which would blow out the burning coals. The new appartus which the defendants have placed upon nearly all their smoke-pipes, and which they intend in a few days to place upon all, will, in my opinion, obviate all the evils complained of. It may,

however, still be possible that such sparks may escape as will cause fire, and the injunction asked for would be violated; it should not, therefore, be granted in that form. And, on the whole, I am of opinion that, under the circumstances of this case, no injunction, however guarded, should issue. But as there was reason for the action of the complainant at the time of filing his bill, as the defendants were then running engines that seem to have been dangerous, and as the injunction is refused on account of the action of the defendants, chiefly since the filing of the bill, and of which it does not appear that the complainant was apprised, the costs on both sides must be paid by the defendants."

The action of the Court below, which was approved and adopted by this Court in the case of *Arizona Copper Company v. Gillespie*, 230 *U. S.*, 46, 55, 57, is in accord with the principles announced in the foregoing decisions. That was a case wherein it was sought to enjoin the plaintiff in error from contaminating the Gila River. The District Court enjoined the company from in any manner depositing or suffering or permitting to be deposited, or suffering or permitting to flow into the waters of the said Gila River or into the San Francisco River or said Chase Creek, in such manner as they might be carried into the waters of said Gila River, any slime, slickens or tailings. Upon appeal to the Supreme Court of the territory, while the finding of facts as to the action of the company was affirmed, yet the judgment was modified so as to permit the appellant to construct settling basins, by means of which the tailings and slimes carried by the Gila River might be arrested, and be prevented from being deposited upon the farm lands; and in the opinion of the Supreme Court of the territory it was said that to enable the mining company to take advantage of any effort it might make in that direction, "it should be left to the discretion of the trial court hereafter upon a proper showing made to it temporarily to modify the injunction so as to permit of reasonable experiments being made to ascertain the probability of successfully erecting and maintaining settling basins to effectually dispose of the tailings and slimes without detriment to the lands lying under the canals *and with authority in the District Court likewise permanently to enforce or modify the injunction in accordance with the conditions as they shall be found to be.*" (p. 55.)

This action was approved by this Court in the following language:

> "The modification of the decree of the Trial Court so as to enable the appellant to complete the construction of the remedial works specified, and heretofore mentioned, met every reasonable equity which was asserted by it. It is in substantial accord with the decree of this Court in a somewhat similar case. Georgia v. Tennessee Copper Company, 206 U. S., 230."

The decree of the Supreme Court of the territory of Arizona thus approved by this Court manifestly meant, that if the conditions should be made better, the injunctive provisions should be limited so as to meet the situation existing. And if it should turn out that the nuisance had been entirely abated, and no further danger was threatened, the injunction should be dissolved altogether.

V.

Complainant's application is in effect to enter a decree nunc pro tunc after an interim of seven years, and the allowance of such an order is not a matter of right, but is within the discretion of the Court.

In Mitchell vs. Overman, 13 Otto, 62, this Court said:

> "Whether a *nunc pro tunc* order should be made, depends upon the circumstances of the particular case. It should be granted or refused, as the justice of the cause may require."

See also 23 Cyc., 840.

VI.

If it was not the purpose of this court, when it handed down its opinion on May 13, 1907, to again consider the facts before entering a final decree, such action became necessary, or at least highly proper, when by consent of all parties, and on application of complainant the entrance of a decree was postponed to determine the result of the efforts being made by defendants to conform to the general principles announced by the Court.

If it was not understood by the parties that only such decree should be entered as would exactly apply to the facts existing after defendants had had an opportunity to test their improved methods and that no injunctive decree should be entered provided the experiment should be entirely successful, why was the entering of the decree postponed? Why was it not then entered, but its enforcement suspended for such length of time as was deemed sufficient to enable defendants to thoroughly test their new method of operating their furnace? If that course had been pursued, and a dispute had subsequently arisen as to whether the nuisance had been abated, that question of fact would necessarily have been inquired into by the Court; but the action of the parties, and the acquiescence of the Court therein clearly indicated that such question should be settled before pronouncing a final decree, rather than by a trial to determine whether defendants were in contempt of Court for violation of the decree. One reason for taking this course, no doubt was the irreparable injury which, as will be hereinafter shown, would be done defendant by entering such a decree.

VII.

This defendant has succeeded in eliminating from the smoke emitted by its furnace all noxious elements which can possibly do injury to any kind of vegetable growth in the State of Georgia, or cause any material inconvenience or annoyance to the citizens of that state.

Upon this question, the following documents are presented and printed as an appendix hereto, to which reference is had without an attempt to here set forth their substance in detail:

Exhibit "A", the commission of W. M. Bowron by the Governor of Georgia, dated October 28, 1910, to inquire into the operations of this defendant;

Exhibit "B", Like Commission from the Attorney General of Georgia of same date;

Exhibit "C", Verified copy of the report of W. M. Bowron in the premises;

Exhibit "D", Affidavit of said W. M. Bowron, showing

the result of repeated subsequent investigations by him, his qualification, attainments, experience and conclusions pertinent thereto;

Exhibit "E", Report of Peter S. Gilchrist and J. M. McCandless, touching defendant's output, operations and results as respects Georgia territory;

Exhibit "F", Affidavit of Peter S. Gilchrist as to the correctness of said report.

Exhibit "G", Affidavit of Professor S. M. Bain, showing his attainments, investigations and conclusions pertinent hereto;

Exhibit "H", Affidavit of C. W. Renwick, this defendant's manager, disclosing its output, operations, efforts and certain facts and circumstances appertaining to the present application.

Exhibit "I", Affidavit of W. B. Miller exhibiting certified copy of verdicts in favor of defendant in the United States District Court at Chattanooga, Tennessee, in December, 1913, wherein the issue as to whether this defendant's operations affected territory immediately South of the Georgia line, was found in favor of the defendant;

Exhibit "J", Judgment of the Court in the case of J. P. and J. H. Vestal vs. Ducktown Sulphur, Copper & Iron Company, Limited.

It further appears from the affidavit of W. B. Miller, Esq., Exhibit "I", that actions for damages claimed to have arisen since the Court handed down its opinion in this case, and to property so situated that it is as likely to suffer damage from fumes and gases emitted by the defendant's furnace as any other property in the State of Georgia, have been tried in the United States District Court at Chattanooga, and the questions of fact submitted to a jury, who returned a verdict in favor of the defendant, and from the judgment pronounced thereon no appeal has been prosecuted.

In 1 High on Injunctions (4 Ed.) Section 740, p. 702, it is said:

> "And especially will relief be denied where in an action for damages resulting from the alleged nuisance there has been a verdict and judgment for the defendant."

And again, in Section 760, with reference to public nuisances, the author says:

"It is held that in cases of doubt, the question of the existence of the nuisance should be determined by a jury before granting the injunction; and where that issue has been settled at law by the acquittal of the defendant by a jury on an indictment for the maintenance of a public nuisance relief will be denied."

Hence, if it had appeared at the hearing that such trial had been had, which had resulted in a verdict for the defendants, that fact alone would have justified, if not required, the Court to dismiss complainant's bill.

VIII.

The form of decree submitted by the State of Georgia makes no specific findings of facts, is general in its character, without pointing out any specific act which defendant shall do or refrain from doing in order to conform to the law, is entirely too broad and drastic in its terms, and in fact in no respect comforms to the requirements of a decree in this character of a case.

The proposed decree sweepingly enjoins the defendant from doing about everything mentioned specifically or suggested in the original bill and its prayer. And if defendants had emitted and were still emitting noxious fumes and gases, which caused the injuries and inconveniences indicated by the decree, its requirements go far beyond the principles of law relating to either public or private nuisances.

It may be insisted that this Court, in the opinion handed down on May 13, 1907, announced a more stringent rule as to what constitutes a nuisance when a state in its sovereign capacity is complaining, and that in such a case the decree should be more drastic. But such contention is not at all justified. The language bearing on this question appears in 206 U. S., pp. 237-8.

The distinction between this and other cases involving nuisances there drawn by the Court consists wholly in the character of relief to which the State of Georgia is entitled. That is, if Georgia is entitled to any relief at all, it is to be a specific one, if she so wills, rather than a compensatory one. But the language of the Court shows that in determining whether or

not a case is made out and the character of the decree to be entered, if *any* distinction exist between this and a case between private individuals, the Court should here exercise more caution in those involving public nuisances. That the Court did not intend to hold that the State of Georgia could prevent all smoke from being carried over its domain is apparent from this language:

> "It is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted *on a great scale* by sulphurous acid gas."

Furthermore, specific reference was made to the case of Missouri v. Illinois, 200 U. S., 496, as setting forth the rule which governed the Court, in determining whether or not a nuisance existed, and the Court there certainly did not modify the principle, that there should be some *material* and *substantial* injury in order to justify a decree for the complainant. In that case the Court said:

> "Before the Court ought to intervene, the case should be of serious magnitude, clearly and fully proved, and the principle to be applied should be one which the Court is prepared deliberately to maintain against all considerations on the other side." (200 U. S., 521.) And the bill filed by the State of Missouri, was dimissed, because its allegations were not sustained by the evidence.

It is well recognized that the Courts should proceed with the greatest care in determining whether an obstruction or certain acts constitute a public nuisance, and should not extend their decrees with reference thereto beyond the facts clearly proven. In High on Injunctions, Section 760, it is said:

> "But to warrant an injunction against an alleged purpresture or public nuisance, it must clearly appear that it is such in fact, and if it be doubtful whether there is a purpresture the relief will be withheld."

Attorney General v. Delaware and Bound Brook R. R. Co., 27 *N. J. Eq.* (12 *C. E. Green*), 1, was an action brought to have removed a viaduct built across a navigable river, on the ground that the structure was a purpresture and public nuisance. The Court held that:

"If it were merely doubtful whether there is a purpresture or not, an injunction asked for on the ground of purpresture will not be granted. To warrant an injunction in such case it must be clear that there is a purpresture."

And again:

"In an action to remove an erection in a public river on the ground that it is an injury to the *jus publicum*, the common right of navigation, it must appear that a nuisance, in fact, exists, even though the erection be an encroachment on the soil of the state."

This Court has declared this principle with even greater emphasis. *Mississippi & Missouri R. Co. v. Ward*, 2 *Black*, 485-495, was an action brought by a private individual to have abated an alleged public nuisance, to-wit: a bridge over the Mississippi River. The Court in the first place held that under such circumstances the private party acts rather as a public prosecutor on behalf of all who are or may be injured. With reference to whether that part of the bridge within the jurisdiction of the Court below was a public nuisance, the Court said:

"Is the bridge West of the Illinois boundary an *unreasonable* obstruction, and therefore a nuisance? In considering this question we must be governed by the same rule on which a court of law could proceed in case of an indictment against the bridge company for committing the nuisance; and the rule is that if the abridgement of the right of passage occasioned by the erection was for a public purpose and produced a public benefit, and if the erection was in a reasonable situation, and a reasonable space was left for the passage of vessels on the river, then it is not an unreasonable obstruction and indictable. Rex v. Russell, (6 Boren & Crews, 566; 13 How., 623, 15 Wendell 133.)

"Then, again, the obstruction to navigation must be plainly a nuisance within this rule before it can be removed by decree. If the proceeding was by indictment and the jury doubted whether the obstruction was a nuisance or not, they would be instructed to acquit the defendant;

and so, if this case was referred to a jury to try the fact, and they doubted, they would be bound to acquit, and the same rule applies in a Court of Chancery when the Court ascertains the fact of nuisance. 2 Storey's Com. on Eq., 203-204."

The fact that the State of Georgia here sues in its own name and by authority of a special act of the Legislature, and to enjoin the operation in a certain way of a manufacturing plant situated outside its territory, does not alter these principles. The question remains, whether defendant is maintaining a public nuisance in the State of Georgia; and that question must be tried out *and the same kind of a decree entered, as if Georgia were suing one of its own citizens in its own courts.*

This is true, because, in the first place, Georgia has not attempted to enact a special law applicable to those who reside or operate a business outside the state whereby it is claimed a nuisance was committed in the state. Special Legislative authority to bring this action did not work a modification of the principles upon which it was to be tried, or the character of decree to be entered.

In the second place, without considering whether the State of Georgia could make a discrimination against those operating a plant outside the boundaries of its state, it is apparent that the decree here proposed would violate the Fourteenth Amendment of the Constitution, because, as some smoke might be carried beyond the Georgia line, it would prevent a further operation of defendant's plant, regardless of whether any *material* injury was being inflicted upon the citizens of the State of Georgia or not, and hence would deprive it of its property without due process of law.

IX.

A decree of the character of that proposed would be a continuous menace to defendant's existence, and very detrimental to its interest.

It is apparent that no case can present stronger grounds for refusing an injunctive decree when the reasons for its issuance no longer exists, than is presented by the present one.

The defendant is operating a large smelting and acid plant,

and has a large sum of money invested therein. It is essential that in carrying on its business, some smoke be emitted; and the winds may carry a very small proportion of that smoke over the State of Georgia. Hence, if a decree of the character presented be entered, there is a continued possibility that the State of Georgia might attempt to invoke its provisions, and have defendant's plant entirely closed up; or, might at least annoy it with proceedings for contempt, and necessitate its making proof of innocence.

It may be, from time to time, that this company, as other industries of this character do, will desire to raise funds to prosecute its business more extensively, or may deem it advisable to increase its capitalization, or issue bonds for the purpose of enlarging its plant. But, it is apparent that with its very existence menaced by a permanent decree of this kind, entered upon the minutes of this court, though lawyers may know that this Court would not enforce its provisions without proceedings regularly had, and clear and convincing proof, yet, it would be impossible to negotiate the sale of such bonds, or stock.

For the foregoing reasons, it is insisted that either the Court should refuse to set aside the continuance heretofore entered; or, if said order is vacated, should appoint an examiner to take evidence presented by both sides, and determine therefrom whether or not this defendant is now in any respect committing a public nuisance in the State of Georgia.

J. A. FOWLER,
Solicitor for the Defendant.
Ducktown Copper, Sulphur & Iron Co., Limited.
W. B. MILLER,
H. G. FOWLER,
Of Counsel.

APPENDIX

EXHIBIT A.

State of Georgia,
Executive Department.
Atlanta, October 28th, 1910.

Ducktown Sulphur, Copper & Iron Company, Limited,
Copperhill, Tennessee.

Gentlemen: I am sending Mr. William M. Bowron, an expert mining engineer, to your plant to make an examination in reference to the conditions there, of your operations in so far as they affect the people and the territory of this State. He goes as the agent of the State of Georgia and with my authority. I ask that you allow him every facility to go over your plant and to observe and examine into your work, giving him such data and information as will enable him to make a correct showing of the exact facts.

Yours very truly,
JOSEPH M. BROWN,
Governor of Georgia.

EXHIBIT B.

State of Georgia,
Attorney General's Office.
Atlanta, October 28th, 1910.

Ducktown Sulphur, Copper & Iron Company, Limited,
Ducktown, Tennessee.

Gentlemen: At my solicitation the State of Georgia has employed Mr. William H. Bowron to make an investigation as to the operations of your plant and the effects, if any, of the copper fumes upon the forests and crops of the citizens of this State, to the end that the true facts may be learned. I beg that you will accord him a full opportunity to make a thorough

investigation of the matter and that you will give him such information as may be necessary for him to make a full and complete report to this department. In this connection I wish to state that if the numerous complaints reaching me from the citizens of Georgia in and about your plant are confirmed, I shall have to take such steps as may be necessary to protect the citizens of Georgia. If these complaints are not well founded, then it is to the interest of your company to demonstrate the facts so as to put an end to the charges that are being made, and I trust you will afford Mr. Bowron full opportunity in this matter to make a thorough investigation.

I beg to remain, very truly yours,

H. A. HALL,
Attorney General.

EXHIBIT C.

Chattanooga, Tenn., Nov., 1910.

Hon. Joseph M. Brown, Governor of Georgia.

Dear Sir: As a consulting engineer I was informed by the Hon. H. A. Hall, Attorney General, that numerous complaints had reached his office relative to damages suffered by the citizens of the Counties of Fannin, Gilmer, Townes and Murray and adjoining counties, to their gardens, farms and products, works, homes and health as the result of the continued emission of poisonous gases and vapors from works in Tennessee near the State line. Works are at Copperhill, Tennessee, and are owned and operated by the Tennessee Copper Company, a corporation believed to be organized under the Laws of New Jersey.

Other works are at Isabella, Tennessee, some three miles distant from the first named and the works carried out at both is copper smelting. The latter works are owned and operated by the Ducktown Sulphur, Copper & Iron Company, an English corporation doing business in Tennessee.

The result of the consultation was that you authorized me to go to the district said to be affected and to the works in Tennessee and to ascertain the exact facts pertinent to the matter and to report them to you.

I accordingly went and as the works are extraterritorial, I did not know whether your written request for permission

to visit these details of their manufactures and to be furnished with all pertinent data would be honored or whether, as the works are involved in litigation over the same question of smoke damage, the directors in the Eastern and English offices might have imposed conditions of exclusion which would have prevented their local representatives from being as hospitable as their natural inclinations would have suggested. I therefore, determined instead of going direct to Ducktown and announcing my business to leave that to the last, so that my mission not being suspected, I would be at liberty to collect such data from the outside as would enable me to make a correct representation of the Status of matters, even if I were met with "polite refusal" at the gates.

It is here pleasant to be able to state that I was met with the utmost courtesy and no facts demanded were withheld at the time of my visit.

WHAT THEY DO AS A MANUFACTURER.

Taking as a short, recent and accurate report an extract from a paper prepared by Mr. B. Britton Gottsberger the then General Manager of the Tennessee Copper Company in October, 1908, at a visit of the American Institute of Mining Engineers:

> "The ore from the mines is delivered by the railroad to the smelters-bins, which have a capacity of 10,000 tons of ore, 800 tons of coke and ample space for the storage of flux and furnace products to be retreated. Charges are drawn from the bins in the side dump, cars of 44 cu. ft. capacity, hauled by electric locomotives. There are four tracks under the bins provided with scales for weighing charges.
>
> "There are seven blast furnaces, three 56-inch by 180-inch and four 56-inch by 270-inch at the tuyeres. The height from Tuyeres to charge floor is 18 feet and from tuyeres to sole plate, 3 feet 6 inches.
>
> "The small furnaces are provided with twenty six 5-inch tuyeres and the large ones with fifty 3.25-inch tuyeres arranged in pairs. On furnace No. 7 the space between each pair of tuyeres has been cut away, making the tuyeres

opening a slot 4 inches by 12 inches. Blast is furnished to the furnaces at a pressure of 50 ounces at the poer house and each furnace takes approximately 1000 cubic feet of air per minute per foot of length. The air consumption per ton of ore smelted is from 70,000 to 90,000 cubic feet.

"The furnace gases are discharged either into a brick lined balloon flue or into the concrete flue below and immediately behind the furnaces. Both flues discharge into a dust chamber 209 feet long, 30 feet wide, and 20 feet high at the end of which is a radial brick stack 325 feet high and 20 feet inside diameter. Dust is removed from the chamber by two conveyor belts placed in a tunnel under the chamber.

"The smelting is on two stages. The first consist of a concentration of the ore to a low grade matte, averaging about 15 per cent of copper. This matte is cooled in beds on the slag dump and then broken up and hauled to the smelter bins. The second stage is a concentration of the first matte to matte of converting grade. This can be varied at will, the present practice being to produce a matte of about 32 per cent of copper, which is easily handled in the converters. . . .

"The converters equipment consists of four electrically operated stands, and 15 converters of the trough or leghorn type 7 by 10.5 feet. Two 40-ton cranes handle the matte from blast furnace settlers to the converters. The converted metal containing about 99.4 per cent of copper is cast into pigs, each weighing about 210 pounds."

Much of this is irrelevant but is quoted for the sake of completeness and to have in convenient shape some authentic measurements from which we can calculate.

All the foregoing refers to the works of the Tennessee Copper Company at Copperhill, Tennessee, situated on the north bank of the Ocoee River a few hundred yards from the Georgia line.

The works of the Ducktown Sulphur, Copper & Iron Company at Isabella will be described separately and later on.

The ores used at the Tennessee Copper Company's works described above are local ores known by the names at the mines

whence they are extracted. They are as follows:

(Each being a compound of sulphur, iron, copper, and rock.) The analysis of each is given under each name in the relative quantities of each used. From this can be calculated the quantity of sulphur daily burnt.

Name of ore	Sulphur	Copper
Burra Burra	26.2	1.84
London	19.9	2.41
Polk County	18.4	1.99

These analyses were given me by the General Manager. The ores have been mined as under in the years quoted.

Year	Burra Burra	London	Polk Co.	Total
1901	71,057	35,342	39,721	
1902	105,820	85,840	59,109	
1903	120,006	92,266	75,153	
1904	88,510	31,716	24,763	
1905	131,652	63,375	17,802	
1906	201,726	72,212	89,603	
1907	225,040	60,557	98,034	
1908	not available			
1909	264,683	81,952	93,208	

figures published by Tennessee Copper Company.

These ores were smelted in the following average proportion: Burra Burra, one-half, and London and Polk County one-quarter each. This gives an average sulphur content for the whole melt of 22.65%.

The following figures are instructive.

439,365 tons of ore smelted in 1909 which means 101,704 tons of sulphur were burned during the year and 324 tons per day.

Complaints have been made, it appears, from time to time from the adjoining land owners of damage to lands and crops and in due course, litigation ensued. In the year 1904 the litigation seemed to have reached to the Supreme Court of the United States.

During that year the quantity of ore smelted was 241,855 tons, just about one-half of what was treated last year. This company promised the Supreme Court to use all means to abate the nuisance.

This is no new question.

"The Freilburg Smelting works were scientifically examined in the middle of the 19th century on account of the complaints of farms of the death of plants and cattle. So long as the metallic contents of the smoke were held responsible for the damage not much progress was made.

"A. Stockhardt was the first to recognize that sulphuric acid was the injurious agent. This caused the erection of the sulphuric acid works, now in operation for forty years, which utilized the greater part of the sulphuric acid. Yearly the injury diminished, until in the eighties a narrow strip next to the works alone suffered damage and the State purchased it."

Die Beschadigung der Vegetation nach Rauch, Haselhoff and Lindau. Chief Forester and Professor of Botany.

(Published by Bartrager Bros., Leipsic).

The European practice would appear to have been to keep the collection ahead of the generation. This is not the case at Copperhill. In the year 1906 and in the month of July the mammouth chimney 325 feet in height and 20 feet internal diameter was used, all the gas was turned into it and it passed out at an elevation of about 350 feet above the Ocoee River.

The then General Manager was most enthusiastic during its construction as to the benefit that would accrue to the whole neighborhood from the altitude of dissipation of the vapors. He was mistaken. The general experience of high chimneys has been duplicated at Copperhill; the spreading of poisonous vapors over areas previously unaffected.

To return to the process and the emission of vapors. When Stockhardt added sulphuric acid chambers to the works at Freiburg he only divided the open air roast heaps and calcined smaller portions in kilns. These kilns were comparatively small, holding a wagon load of ore at a time, the bottom was made of movable grate bars, covered with burnt ore, which protected the iron from the burning sulphur in the ignited ore that rested on it. As the sulphur burned out, new ore was added and by revolving the iron bars on which the whole mass rested, the

burned ore was shaken out at the bottom and the ore was kept at an average height. These kilns were built in tiers and delivered their sulphurous fumes into a central flue, which, in turn, connected with chambers of large capacity, lined with sheet lead, and whilst the vapors were on the way they were made to encounter iron pots which contained "nitre" or nitrate of potash or soda to which has been added strong sulphuric acid. The initial heat of the gases causes decomposition of the nitre and the result in the pots is sulphate of soda, or potash, as the case may be, and a gas of a dark orange color called "nitre gas" by the chamber men. This mixes with the sulphurous gases and by a chemical reaction, described in any text book, the sulphurous acid (sulphur dioxide) is converted into sulphuric acid.

These reactions were easily managed with a uniform flow of gas from the kilns or burners, little or no admission of air and low temperature.

The Copperhill problem was entirely different. At Freiburg and at all regular pyrites burning sulphuric acid plants the quantities could be controlled and the gas was about six per cent acid. At Copperhill the quantity of gas is enormous, variable in richness and with only a richness of about one-half what it should be for normal practice. Besides, the quantity to be dealt with is so large and the fluctuation in volume so irregular that the methods, sizes and conditions of the past were little guide to designing the necessary structures.

As an engineer I recognize and testify to the magnificent inventive ability by which the successive difficulties have been conquered.

As this report deals with a very technical subject it may be well to add a little here. The acid chambers at Copperhill are about 70 feet high and inside are more like public halls than chemical receivers. Steam is admitted and the sulphurous gas in presence of steam and hypo-nitric acid is converted to sulphuric acid which falls as a general rain to the bottom, whence it is removed. Now the expensive ingredient in this operation, is nitre; so to save this gas, after the gases leave the last chamber (in the Copperhill case, the twelfth) they are

led into the bottom of a tower. This tower is carefully packed with coke over which cold strong sulphuric acid is dripping. The rough surface of the coke exposes an enormous surface of acid to the vapors. Here the nitrous gases are absorbed. The waste gas is now freed from their acid are allowed to escape. This tower for absorbing is the Gay-Lussac, so called for the eminent French Chemist who suggested it. The nitre charged sulphuric acid is pumped to the top of another tower, packed with quartz or specially prepared porcelain plates, so arranged as to show a large surface and yet be permeable to the passage of gas. Through this, upward, are directed the hot smelter gases loaded with their sulphurous contents. From the top trickles the nitrous acid, the product of the other tower. Here it gives up the nitrous gas, on heating, which it absorbed, cold, in the other (Gay-Lussac) tower. The red hot gases in ascending, boil the water out of the dripping weak acid which has been pumped up for that purpose, and is flowed down the tower concentrating it, whilst the steam, mingling with the new gases and now freed nitrous vapor rises to the top to be cooled in suitable apparatus and admitted to the chambers, in its turn to give up its acid contents. The process is continuous. All the gases, red hot from the furnace are gathered into a huge chamber where they deposit their dust and solid contents and go thence to the chimney. As the very large quantity of gas is far beyond the capacity of the chambers, the portion of the gas is withdrawn by mechanically operated fans, which in turn, govern the circulation of the chimney.

The one point, outside words of praise for mechanical excellence of their work is the fact that notwithstanding their knowledge that hostile legislation was impending, they deliberately increased their production year by year with the full knowledge that the acid plant that they were erecting could not at best collect the acid fumes even then made.

The conclusion is inevitable with full view of all the circumstances, that these gentlemen have not acted in full faith in attempting to remove the poisonous gases from afflicting the agriculture and forest of the State of Georgia, except as far as there was profit in it, and under the same first thought of profit have increased their smelting so far beyond their acid

saving plant that the nuisance is as actual, as blighting in its effects, and as remediable as ever. Some illustrative history may here be inserted.

Three or four years ago the Trade Journal announced that the Tennessee Copper Company had been purchasing a large number of fertilizer factories in the South.

This was more probably an investment as individuals of the largest stockholders in said copper company. The corporation was formed under the laws of some State, I know not which, for the scope of my investigation was not located in places where certain information was forthcoming. The corporation took the name of the International Agricultural Corporation. It relieved the Tennessee Copper Company of the trouble of marketing its acid and collecting payments for it. The company runs its acid into huge tanks, whence by gravity, it is piped to tank cars as the orders come from said International Agricultural Corporation. Where the interests are identical, copper and fertilizer, business would dictate that one should be run to assist the other.

That would appear to be the case here. If more acid were made than is the case at present, it would demoralize the fertilizer market, and a leading official of the agricultural corporation is reported to have said so.

It, the acid manufacture, is admittedly profitable. The parties who are interested would appear to desire to keep it so. Rather than demoralize the fertilizer market, it pays to run the risk of possible penalties and adverse verdicts from the courts.

Some history is here necessary to be joined to statistics of what they have done.

The ore mined by this company is as follows for the past ten years:

1901	146,120 tons.	Roasting the ore in roast heaps.
1902	250,729 tons.	
1903	287,465 tons.	Suit filed in Supreme Court, Sept. Term.
1904	44,799 tons.	
1905	219,602 tons.	October began testing.
1906	363,741 tons.	Acid plant began January 1.
1907	383,631 tons.	Acid plant put to work, December.

1908 501,056 tons. December, plant no good, New Manager.
1909 439,843 tons. Plant doing good work after May.
April 19, 1909, new (2nd) unit begun.

This shows that the production of copper has gone on increasing with a temporary drop just after suit was filed in the Supreme Court of the United States.

As a further light on the subject, prices of copper are put here for the same years. The value is in cents per pound.

1901	15.85
1902	11.13
1903	13.23
1904	12.39
1905	15.26
1906	18.05
1907	19.23
1908	13.01
1909	12.07

In the same connection it will be advantageous to quote the present cost of making copper. This is extracted from the yearly report of the Tennessee Copper Company made by the General Manager. This report was shown me with permission to use the figures.

The cost of mining and smelting is also given and is added here in the interest of completeness.

	Per Pound Copper.
Mine development	.00381
Ore mining	.03428
Smelting	.04098
Converting	.00459
Railway	.00183
Engineering and Laboratory	.00120
General Expense	.00484
	$0.09153

or 9 1-8 cents per pound to produce. The present price of copper leaves a fair margin of profit. This is an inducement to push the make of copper. By the same report 14,352,954 pounds of copper were made during the year 1909.

The total ore smelting during the year from the mines was 439,365 tons. The figures could be extended indefinitely but for the purposes of this report the sulphur content are more in order.

Annual Sulphur in Tons Burned at Copperhill, Tennessee, for the years indicated and in the Ores mentioned.

Year	Burra Burra	London	Polk Co.	Total
1901	18,615	7,041	8,730	34,386
1902	27,623	11,382	9,776	54,881
1903	31,452	18,360	13,828	63,640
1904	23,189	6,311	4,556	34,056
1905	34,492	11,611	32,075	49,378
1906	52,904	14,369	16,487	83,760
1907	58,960	12,050	18,038	89,048
1908	details not available			
1909	69,346	15,308	17,050	101,704

In this connection it is only necessary to note that suit was brought in 1903 and the gas was not turned into the chambers for the purpose of saving until 1907, but the gas turned into the air was over 25,000 tons more than when litigation was started. Here are some data in the form of a letter from Mr. W. H. Emmons, the General Manager of the Tennessee Copper Company. (It is pleasant to note the personal courtesy and frankness of this gentleman).

We have now followed the tons of sulphur. In 1909 it was 324 tons per day. If the whole of this had been turned into sulphuric acid it would have to be calculated by the following figures, which I quote in extenso, (as I see in the evidence and affidavits which have come under my notice), that some confusion exists on these points.

A word on the subject of chemistry. Chemists have discovered that elements combined in definite proportions for instance, 32 pounds of sulphur would combine with sixteen pounds of oxygen and form 48 pounds of sulphur dioxide or sulphurous acid. Were there any excess of either ingredient it would be left uncombined. For sulphuric acid of the strength

shipped 1.75 which is mono-hydrated sulphuric acid + one part of water. This, following the chemist practice which is the only one that governs these calculations, we have

Sulphur 1 part	32
Oxygen 5 parts	80
Hydrogen 4 parts	4
	116

$=H_2SO_4+H_2O$

so it is evident that out of 116 parts of sulphuric acid of shipping strength of 60 Baume we have 32 parts of sulphur. From Mr. Emmons' letter the acid now made is 400 tons which would account for 110 tons of sulphur.

The other side of the calculation would have caused from the 39000 tons expected by Mr. Emmons to be mined in October, 1910, to have given 8775 tons of sulphur, which if made into acid would have amounted to 31784 tons. By Mr. Emmons' letter they actually made 9200 tons leaving a deficiency 22484 tons the sulphur of which wasted its strength on the forests of Tennessee, North Carolina and Georgia. The sulphur in the said deficit was 6201 tons for 238 tons per day. Should the wind be from anywhere north of due east or west, the gas from this amount of sulphur goes into Georgia.

The first condition of sulphur when it is burned is that of sulphur dioxide or sulphurous acid gas. This is a colorless gas with the familiar choking properties that attend its combustion. It corrodes, bleaches and by a quick chemical change becomes sulphuric acid in the presence of light and moisture, and in the dark if any nitrous gas or ozone is present.

Before leaving the subject it would appear that the unit capacity of the chambers is calculated on a hundred tons of sulphur daily. When the chamber capacity mentioned in Mr. Emmons' letter of November 30th is all in use, about two hundred tons of sulphur will be saved, leaving still a balance for the outer air and destruction of vegetation. I asked Mr. Emmons whether they were going to go on constructing chambers and he stated that that was beyond his province and would have to be dealt with by the directors and higher officials in New York.

The structures and appliances for the purposes of preventing the pollution of air are not and never have been adequate to the sulphur burned and still the production of ore and the consequent gases liberated by its fusion has steadily increased.

That the Tennessee Copper Company were alive to the deleterious nature of the gases with which they were flooding the country is shown by the fact that in this year when the growing season was at its height, the mining and smelting was reduced. In May to 26944 tons, in June to 20456 tons and in July 30493 tons. Mr. Emmons gave me the figures adding that they "make it up the balance of the years when the smoke would do no harm." Thus took it for granted that the growing season was the only period when foliage was susceptible to harm from sulphur dioxide.

This, I believe to be a mistake, as I shall show in a later part of this report.

We have in the month of October, 1910, the large quantity of sulphur, 22484 tons, mined, presumably smelted.

There is a slight allowance to make. The following analyses shows that some of the sulphur goes into slag.

SLAG MADE IN 1908.

	A	B
Silica	41.4	35.4
Iron	39.3	46.5
Alumina	4.4	2.0
Lime	8.2	10.1
Magnesia	2.7	2.5
Zinc Oxide	1.5	1.1
Sulphur	1.2	1.3
Copper	.28	.41

A is blast furnace slag from the smelter.

B is concentration slag.

So from 22484 tons we must deduct about 1½ per cent of sulphur. This leaves 22147 tons of sulphur that polluted the air in one month, the month of October, 1910.

What is sulphur dioxide—the condition which sulphur assumes when burnt.

Bloxams Chemistry defines it as "a very heavy colorless

gas, characterized by its odor of burning brimstone." After some remarks, interesting from a chemical view point but irrelevant, here he continues "another very useful property of sulphurous acid is that of arresting fermentation apparently by killing the vegetable or animal growth, which is the cause of the fermentation. The disposition of sulphurous acid to absorb oxygen and pass into sulphuric acid renders it a powerful de-oxidising or reducing agent."

No one who has passed through the region affected can doubt its power.

A property not mentioned in the above work, but well known, is the cohesiveness of this gas which diffuses with difficulty.

It is worth while to follow this a little further for it is direct evidence and not theory that I am seeking. I was at the Ducktown hotel October 1st, 1910. Rising early I found the whole basin inside the surrounding hills filled with a dense fog, which settling on the wood work, gathered in drops, which falling were constantly renewed.

I was at that time collecting facts concerning the poisonous gases of the district, their nature and origin. I employed myself in gathering these drops in a clean bottle and on returning to my laboratory, tested the water, so collected, for sulphurous acid. None was found. It had all taken the other atoms of oxygen from the air and become sulphuric acid. This is easily understood, for around the Glover towers there is always a leakage, more or less of hypo-nitric acid, so that in the quiescent conditions of the atmosphere, the condition of the whole basin were, in the presence of moisture, precisely that of an acid chamber. The strength of the sample collected was surprising. It was equal to 73 pounds of sulphuric acid per acre per hour. It is only just to remark that the fog rose as the sun's rays fell on it an hour or so later.

I cannot believe that this acidity was general. In U. S. Chemists, Haywood's testimony in the Supreme Court of the United States, I find October Term 1905, No. 13, p. 26, the following:

> "The ore (of this district) contains, on an average 19 % of sulphur in that the amount of sulphur dioxide that

could be obtained from this ore would amount to 475,000,000 per annum. All the sulphur, however, does not form SO_2 but part is retained in the slag. However, it seems safe to assume that 90% of the sulphur is given off into the atmosphere in the form of sulphur dioxide. On this basis, 427,000,000 pounds of sulphur dioxide would be given off annually. This would be enough to contaminate 42,750,000,000 parts of air with one part of sulphur dioxide to 100,000 parts of air ..... This contaminated air would cover an area of 189,752 square miles to a depth of 100 feet."

This assumes perfect diffusibility which my observations disprove. What all facts point to is a condition which may be described as follows: First, and by way of preface, after Mr. Haywood's visit the Tennessee Copper Company erected a brick chimney 325 feet high above the foundation and about 350 to 375 feet above the surface of the Ocoee River. Its inside diameter was 20 feet. These dimensions more resembled a railroad tunnel than the usual draft stack of individual works. From this cavernous orifice issues the column of smoke and this said column is of high temperature and is composed of nitrogen, air, carbonic acid, steam and sulphuric acid with sulphur dioxide. When this mixture gets into the moist upper air, the mixture is rapidly cooled at the outside contact of the gaseous mass and by the moisture available in the air, externally becomes sulphuric acid, which attracting more hydroscopic moisture, forms an envelope for the hot contained gases.

The wind action breaks the column into separate bodies of gas, each with its sulphuric acid envelope—practically, balloons or bombs, and may vary from microscopic sizes to, in quiescent conditions of air, large dimensions.

They sail off before the winds as other balloons, and so they lose their initial heat, gradually come down till contact with a tree, a fence, a house or a mountain, breaks the envelope and the gases pour out to blast all growing life in the area they can cover. Of course the gases are practically of the same strength as they were when they issued from the stack. Of course no one has been able to experimentally demonstrate this as the height of the stack precludes access. I asked the manager

of the works what the record showed was the acidity of the escaping gases, and was told that they never analysed them.

Turning to the literature of the subject, I find that in the case of Bliss vs. the Anaconda Copper Mining Company, the Montana Supreme Court, recognizing the progressive efforts made to render the fue gases inoxious, and the value to the community of the smelting company's operations, refused to hamper its work and returned a verdict for the defendant.

> "..... Few smelting districts are blessed with the dry air which favors, at the mountain smelteries, the distribution of furnace fumes over a wide area and a minimum production of hydrous acid flue gases."

The equities involved in this decision are dependent on exactly opposite conditions to those of the Ducktown area and surrounding district.

The emission of stray acid vapors from the works of the Tennessee Copper Company is abundantly proved by their own figures.

It is now in order to see what it does. As introduction, it may be well to state the European results on what is comparatively a new subject here.

(1). Even by strong and repeated additions of sulphurous and sulphuric oxides to soils, no essential increase of the sulphur content is affected, no change of the constitution of the soil takes place; and therefore injury to the plants through the soil is out of the question.

(2). Direct actions of free sulphurous or sulphuric acids on the roots of plants is improbable. Should an increase of sulphates occur through the action of smoke gases on the soil, this would have no injurious action upon the growth of plants and may be excluded from consideration.

(3). An injurious effect of plants can only occur when the acid gases come in direct contact with the leaf organs of plants. By injury of plants through sulphur dioxide the quantity of sulphuric acid in the plant is always increased; but as this occurs also when the content of sulphates in the soil increases, the observation by itself cannot prove injury through acid gases. The peculiar condition of each place must be considered.

(4). The susceptibility of different plants to sulphurous acid and sulphuric acids is different; and even the same plants show different degrees of susceptibility according to their location.

(5). Long exposures to even as small a quantity of sulphurous acid as one-millionth has been found injurious.

(6). The various quantities of sulphuric acid collected from the same surface of leaves of two different plants under approximately the same circumstances will not, of themselves, afford a measure of the injury done to the whole organism of the plants; on the contrary, the specific peculiarities of the several plants must be taken into account and submitted to proof.

(7). The cracks in the leaf organs have nothing to do with the absorption of sulphurous acid. The gas is not absorbed through these cracks but by the entire leaf surface, and the amount of absorption depends on the peculiar organization of the leaf.

(8). The effect of the absorption of sulphurous acid is to disturb the circulation of water. This appears in an increased extension of water and results in the drying of the leaves.

(9). The absorption of sulphurous acid, and consequent disturbance of the circulation of water in the plant, is, for the same proportion of sulphurous acid to the air, greater for a given time with light, high temperature and dry air, than with moisture, darkness and low temperature.

The sulphurous acid and acid smoke gases in general, are more injurious by day than by night.

(10). Morphologically, the effect of the sulphurous acid is shown by the formation of spots in the leaves, the death of the leaves and twigs, the retardation of the rings of growths, and finally the destruction of the plant.

(11). In the interior of the cell, plasmolysis is induced; the grains of chlorophyll are destroyed, and finally form with the plasma and other materials a brown and amorphous mass. At the same time, in most cases, especially if the injury has been gradual, tannin separates out, as can be detected by black or brown nodules in the cells.

(12). The mode of action of the sulphurous acid is to be conceived as a disturbance of the life of the plasma in the cell. It probably acts as sulphurous acid produced by the oxidation of the sulphurous acid by the oxygen of the assimilating chlorophyll grains in the presence of water from the cell sap.

(13). By the continuous action of rain or water, from other sources, the sulphurous acid of the dead leaf, organs, which has been taken out of the air, may be again eliminated. In confers, and probably other plants, where the organs are gummy or waxy, the sulphurous or sulphuric acid taken from smoke gases is not further neutralized in the mass, so that the recognition of smoke injury is impossible.

(14). No absolutely sure botanical means exists of recognizing the injuries from sulphurous acid, but it is possible only through the complex or outward or interior injuries, to conclude their presence. The surest proof is the determination of sulphuric acid.

These fourteen conclusions were quoted from a general summing up of the whole European knowledge of the subject by Haselhoff and Lindau. This is *the* authority for German practice.

As will be seen, the determination of plant injury is a complicated one and as the leaves had fallen before I could reach the ground after my employment, the investigation was rendered more difficult.

I took blades of fodder from different points but found contradictory results afterwards explained by finding that the corn that showed high sulphates had been manured with commercial fertilizer—in which sulphuric acid is a component.

As my knowledge of the Ducktown smoke has extended over several years, I can say from personal knowledge that the gas, which I have seen rolling down the Ocoee in waves, business calling me to Parksville, Tennessee, I saw some vegetation which was said to have been blasted by the smoke. It was wilted and as far as the leaves were concerned, probably killed. As an old microscopic worker I knew that the leaves structure unites the breathing and partly the digestive powers of an animal.

The carbon that enters into plant growth is absorbed

through the leaves and decomposed, the carbon being assimilated into sap and then into cell growth, the oxygen being returned to the atmosphere.

The leaf of a plant has an upper surface, the epidermus which has myriads of pores of microscopic size. Where acid vapors are brought to the epidermus exactly the same action takes place as when damage is done to the skin of an animal. In the one case the flow of sap rushes to the place affected to try and wash the acrid attack out of the pores, in the other case the blood rushes to the point attacked with repair leucocytes and serum to minimize the attack and begin repair.

Plants are of lower adaptability than animals. Their abstraction of soil ingredients and moisture is not elastic. When the quality of the sap is changed by the withdrawal of its moisture, it no longer is suited for cell production necessary for growth. Nor is this all. The specific action of sulphur dioxide (which is the same as sulphurous acid) is that of corrosively killing by oxidation. When this action takes place in the delicate microscopic mouths of the breathing pores, they locally die. They can no longer inhale carbonic acid and give out oxygen. Growth is arrested. One attack may be outgrown, but cumulative attacks prove fatal.

The balloons or bombs of acid gas sent from the high chimneys may and do travel miles before the cloud reaches the earth. When it does, vegetation suffers. I have stood at Blue Ridge, Fannin County, Georgia, about ten miles in a straight line from the Copperhill stack and have seen the gray circular clouds, issuing like a gigantic endless rope, which floating high over my head and hardly distended, was carried on its poisonous mission southward to interior points of Georgia.

On my last trip I found the winds that prevailed were from the south and the apparatus I had prepared for sampling the air at different points, had no opportunity of encountering the sulphur fumes. I consequently put myself in the way of getting all the local information as to the extent of damage. At first I got the names of my informants and gave mine, but I soon found that the information was colored by the thought that either the local men did or did not want to be a witness or that he wanted a job at the mines or he had a suit against

them or was preparing one. I adopted a different plan. I am known largely in the immediate district in connection with some land matters in North Carolina, and incidentally asked, as for information as to whether the damage was actual, and if so, what its extent was. I discussed it in that way with several hundred of the citizens of North Georgia. The majority said that the forests were dying fast as the result of the far spreading of the fumes into districts previously untouched.

The damage was reported from points as far distant as Tessantee Gap south of Blairsville; as Murphy, North Carolina; as the farm lands Tacoa; as the valley of Talona; even as far as Talking Rock, Georgia; and in the timber lands of Jack River basin and the hills of Murray County. My informants were not scientific men. They "smelled the smoke since 1906 and their timber begin to die."

One farmer, on telling his experience, seemed to duplicate the accounts of the majority—"I lost my small grain first and it was a total loss. I had a good garden and that was not touched that time, but the next time it came along, it got that. My timber is dying and all since 1906 when they began running the smoke out of their big stack."

One man alone took the position that the smoke and acid fumes were rather a benefit than otherwise. "Why," said he, "I was born and raised in this district, and knew the county as a boy. There is a strip of country between Blue Ridge and McCay's that was very poor and now it's had the acid fumes for a few years, it brings double what it did when I was a boy."

I suggested that good farming and the use of manure was responsible, but he would have none of it, assuring me that the land was never fertilized and the farming was of the most primitive type.

Assuming that his recollection and statement of the facts were accurate, it points to a phase of soil damage caused by the acid fumes that will cost the citizens of Georgia enormous sums of money to repair.

The soils in the district are the result of the decomposition of the rock of the district—slates, micas, saurolites, actinolites, and limestones—marbles with other minerals and

quartz belts, by a dozen or more influences were resolved to a "soil."

The raw soil had to be "broken in" to serve the purpose of plant growth. All are familiar with the raw soil that comes from the depths of a newly dug well. It is unfit for plant life. Gradually, the air and sun and a thousand contributing causes ripen it till the lower forms of vegetation take hold. When they do, the soil bacteria begin their work, which is a formation of plant food from the minerals in the soil. The particles of soil are broken as to their chemical composition and in place of the stable insoluble mineral, is a new compound with a feeble organic acid humic or ulmic which in turn, insoluble enough to resist leaching, is so weak as to be decomposed by the fluids secreted by the pores of the feeding roots of the plant. This enables the plant to assimilate such of its ingredients as are suitable to its wants. It is nature's provision for the gradual supply to vegetation of the all time supply locked up in the soil, which, if immediately available, would leach to the ocean and universal sterility would ensue.

The acid fumes killed the soil bacteria and unlocked the soluble with a larger temporary yield—living on capital rather than interest—so to say.

In that connection, I may say, when at Copperhill I met a Mr. Tyson of a well known Maryland family, who is making some experiments towards the rehabitation of the barren lands round Ducktown and Copperhill. He seemed pleased with his success, although the patches that he had cultivated was small, he had derived much information from these tentative experiments. The mode that had given the best results was by the use of lime to check and neutralize the acid in the ground and then the moderate use of mixed fertilizer.

He gave me an Irish potato raised within two miles of Ducktown and a more handsome potato I never saw. Its skin was speckless. All grub worms and insects that usually attack roots and tubors had evidently been unable to survive the acid in the soil. Also a small ear of corn. These will be handed in with this report.

I asked a number of farmers in North Georgia as to what a man could afford to do if the acid smoke was stopped to

bring his land up to normal conditions. Most of them did not know, scientific farming being outside of their hereditary knowledge, but one or two discussed the matter intelligently. The general concensus of opinion was that land that had been "smoke poisoned" could be brought back by liming at the rate of a ton per acre and by growing a crop of peas or clover and plowing under, whilst in bloom, a crop of corn might be raised next year with fertilizer in the hills.

That meant a ton of lime, freight, hauling, spreading, twice plowing and the loss of a year's farming before the land would raise corn. Most of them said it could be done for ten dollars per acre. In the face of an expenditure like that to make good an inroad against which the farmer has been powerless, I am compelled to report the damage actual, excessive and continuing.

From several points in the district I collected soil samples and made cultures so as to be able to count the baccilli in each soil. I may here add a word of explanation. The general public attitude towards bacteria is rather that of polite incredulity, although to those who have had occasion to study the subject their existence, some of their functions, in some of their habits of life are as much facts as the existence of men or trees. One gentleman phrased his doubt by saying: "If it takes the highest powers of a microscope to see these things at all, how can they be counted with any certainty?"

As the value of evidence depends on its probability I trust a short explanation of methods may not be deemed out of place.

These bacteria are very small. In one form that I have in mind thirty thousand of them end to end would only measure an inch, but they belong to the lower order of vegetation. They mature in less than an hour (in many cases) and reproduce by breaking in two and in from half an hour repeat the process. Each individual is the source of a colony. Now if ten grains of soil are powdered and stirred into a liquid which is fluid when warm but a stiff jelly when cold, the soil makes the liquid slightly turbid. When cold the stiff jelly has the isolated bacteria held in its moist clasp. If the vessel holding the jelly is put in an "incubator" which is a box wherein a constant temperature is maintained, in this case somewhat less than blood heat, and in the dark, the conditions resemble a

summer morning and the bacteria begin to grow, multiply and by repeating the process, the individual soon becomes a colony and is visible to sight of the naked eye. Therefore, by putting over the shallow glass dish in which the cultivation has taken place, a transparent substance, graduated into divisions of equal size, it is easy to see how many divisions the whole dish occupies, and by counting the colonies in each division the aggregate is obtained. The weight of the quantity of earth being known the calculation is simple. The preparation of the jelly and all operations connected with it have to be done under scrupulously sterilized conditions or strange baccilli would be introduced which would destroy the results.

I found in similar quantities of soil the following bacteria. I may add that the samples were taken from near the surface from road ditches and railway cuts, so that farm manure should not have influenced the results by the inclusion of new life forms not proper to the soil. For each gramme or 15⅓ grains for comparison.

Atlanta, from R. R. cut near Terminal, possibly fertilized in time	32,500
Merietta, from West Polk St. may have had garden soil mixed with it	36,000
Murphy, North Carolina	29,000
Blue Ridge, Ga.	22,300
Mineral Bluff, Ga.	27,250
Ducktown, Tenn.	280
Isabella, Tenn.	120
Copperhill, Tenn.	170
McCays, Tenn.	190

These were the results after 48 hours incubation. This shows, interpreting these figures, that the recuperative power of the soil, after deflection of its growth elements by vegetation is strong at Atlanta and Merietta, although the probabilities are in favor of the soil having been stimulated by fertilization in these two cases. At Mineral Bluff, Georgia, the soil was cultivated within a few years but shows ample bacteria, but inside the sterile areas of Ducktown, Isabella, Copper Hill and McCays, the recuperative power are almost nill. Were the acid fumes removed, at the cost of about ten dollars per acre, as

shown by Mr. Tyson's experiments, the land would be amenable to culture. This however, is impossible on the vast areas which hold Georgia's forest reserves.

In an exhaustive study of the subject, Prof. Persifor Frazer of Philadelphia, Pa., which was published by the American Institute of Mining Engineers in April, 1907, I find the following passage:

> "Where the external parts of plants are constantly exposed to the action of this poison (sulphur dioxide) through years, the percentage (of sulphates) in the leaves shows a slightly excelerated increase with their age. Younger plants, with more vitality, on the whole show fewer symptoms of disease and approaching death than older plants, because they are better able to survive the successive impairments of the leaf organs, and also to eliminate the active cause of destruction."

From this, as well as personal observation, I gather that our friends of the Tennessee Copper Company when they restricted their operations "in May, June and July making it up later" were dealing with impressions rather with a close knowledge of vegetable physiology.

I spoke to the officers of the Tennessee Copper Company as to the damage that was being caused by their acid smoke, and was met by the argument that they "spent $75,000.00 per month in pay roll and if they shut down the country would starve." As I had no authority to adjust the numerous equities involved in such a set off, I did not inquire as to whether the parties damaged received the whole or any part of the above sum.

I regret to have to report that I was not able to find a shred of evidence that the said Tennessee Copper Company has ever made any effort to abate the nuisance complained of, except the erection of a high stack, which not only failed its purpose but was the means of spreading the fumes to the destruction of large bodies of timber, hitherto beyond its range.

There is no reason "to shut them up." There is every reason to ask them to restrict their output of ore and smelting operations so as to be able to take care of all the sulphur dioxide generated, with the exception of such occasional leak-

ages as attend nearly all branches of manufacturing on a large scale. These, like the noise of machinery, smoke and various other intrusion on the quiet and rights of the public are tolerated within certain limits, for the good of the common family that civilization gathers together for mutual interests.

I have some photographs. They are self explanatory.

There is another feature of damage to the State of Georgia directly attributable to the sulphurous fumes emmitted by the copper operations of the Ducktown regions. I refer to the effect on the roads. As a matter of fact the roads of North Georgia have always been bad but up to the time when sulphurous emanation began they were always improvable and the improvements would stay until worn out by usual travel.

By the destruction of the soil bacteria the surface growth of vegetation is checked in the areas adjacent to the roads. There is no longer the plexus of rootlets to hold the soil and bind it to its place, so that, in the hard rains that occasionally fall, the surface, formerly held in its intergrity, now erodes into gulleys of first small size, but becoming larger, become brawling torrents which cut the roads and render travel unsafe. It is trite to say that the roads have to be repaired anyhow at intervals. The time, labor and expense annually put on the roads would confer more lasting benefits to the people of Georgia, were the natural conditions of climate and topography only to be dealt with.

I now pass to a consideration of the Ducktown Sulphur, Copper & Iron Company, Limited, and their works at Isabella, Tennessee.

This company is composed as follows, as given in Moddy's Annual, 1908:

DUCKTOWN SULPHUR, COPPER & IRON COMPANY, LIMITED.

Incorporated February 16, 1891, under the laws of Great Britain. Property consists of the Mary, Calloway and other mines of Isabella, Polk County, Tennessee. Ores are suphides averaging under three per cent of copper worth gold and silver values. Main shaft is 600 feet deep. Equipment comprises

both steam and electric power. Smelter has a daily capacity of 500 tons of crude ore. In 1903 a change was made from heap roasting of the ore to pyritic smelting system, with the result in saving of about three cents per pound in refined copper productions. The mine has a producing capacity of over 6,000,000 pounds of refined copper per annum and is one of the principal producers in the appalachian field.

Capital Stock authorized 75,000 pounds. Issued 66,000 pounds. Par 1 Pound. Debentures 38,300 pounds first mortgage at 5% and 7,735 pounds second mortgage at 7%. Has paid dividends of 963 on ordinary capital stock and 19.114% on Founders shares.

Officers: Col. Jas. Le Guyt, Chairman; H. Godber, Sec.; Jos. Gordon, Gordon Mgr. and Director; Jas. Worley & Sons, Auditor; C. W. Renwick, Gen. Mgr.

Office 1, Gresham House, Old Broad St., London, E. C., and Isabella, Tennessee.

Note: 1 pound sterling equals approximately $5.00.

Let me now add the figures procured from Mr. Renwick.

Year	Ore Smelted
1901	110,627.
1902	127,615.5
1903	91,310.4
1904	138,524.5
1905	184,828.7
1906	189,506.
1907	182,857.8
1908	142,786.2
1909	140,508.5
1910 (first six months)	106,922.
Total	1,415,486.7 tons

The sulphuric acid shipments for October, 1910, were 4302 tons or equivalent to 52° B 5206.7 tons. These details have

been kindly furnished me by Mr. C. W. Renwick, resident General Manager.

They have two furnaces but only one was in operation when I went to Isabella. I went unannounced and from the top of the hill overlooking the plant. No acid smoke was seen coming from their stack and the outlets from their Gay-Lussac towers showed no undue leakage. In other words, as the smelting records show, they cut down their output to about what they could take care of in the way of sulphurous acid fumes or smoke. They have a well built acid plant working perfectly when I went over it, and taking care of the sulphur dioxide as formed. Half an hour after my arrival the automatic furnace charger broke down and there was considerable leakage of gas whilst charging by hand. A couple of hours later the repair was made and the emission ceased at once. The works are very competently managed as to the chemical and mechanical parts, and there really seemed to be a conscientious effort to comply with the obligations to abate the sulphur dioxide nuisance. It is however, fair to say that if the price of copper advanced, it would be a strong temptation to increase their smelting beyond their facilities for acid collection. They complain that they have further acid chambers partly constructed but their English directors did not wish to assume the expense of finishing them and so locking up a further sum of money with an injunction from the Supreme Court of the United States hanging over their heads. There may be an equity in this which counsel can deal with, now that I draw attention to it.

They sell their acid output to the International Agricultural Corporation and I fear with an intimation that a larger output of acid would not be welcome, so instead of sending their unsalable acid to the skies as their neighbors do, they restrict production.

I have no proof that this is the controlling reason for their moderation of production, but consider it worthy mention as having possible weight with them, because it suggest a danger.

If the market is blocked by this local trust for their acid, and the copper market took a rise it would oppose cupidity to conscience, and that is a difficult position. At the time of my visit they were not sending poisonous gases into the State of Georgia.

The chimneys are low and the basin in which their works are situated is three miles away from Georgia. It was rendered absolutely desolate by the roasting of ore years ago. It has not recovered to any appreciable extent. It is still a picture of desolation. This however, is in Tennessee and does not affect the State of Georgia.

EXHIBIT D.

State of Tennessee)
Hamilton County)

W. M. Bowron, being duly sworn, says that he is a chemist, chemical and construction engineer of long experience, that he began his studies at Edinburgh University and subsequently was assistant to Dr. George Lunge in the operation of sulphuric acid works. Said Lunge is the leading authority on the manufacture of sulphuric acid and is at present Professor of Applied Science in the University of Zurich, Switzerland.

Affiant has served as Technical adviser in matters involving a knowledge of chemistry to many corporate enterprises and was for a number of years Chemist to the Tennessee Coal, Iron & Railroad Company.

He is and has been, for a number of years, well acquainted with what is known as the Ducktown Basin in Polk County, Tennessee, and the territory lying immediately south, in the State of Georgia. He knows the location, method of operation and construction of the smelting and sulphuric acid plants of both the Tennessee Copper Company and Ducktown Sulphur, Copper & Iron Company, Limited.

He is the same W. M. Bowron who was commissioned by the Governor and Attorney General of the State of Georgia, on

October 28th, 1910, to visit said Ducktown Section and make report as to the operations of the two companies above. His respective commissions from said officials of Georgia being hereto attached.

Pursuant thereto and shortly thereafter, affiant visited the section in question, with which he was previously well acquainted, and made a truthful report embodying the results of his visit and his conclusions to the Governor of Georgia, copy of which is also attached hereto.

Affiant has subsequently visited said Ducktown Section repeatedly and has made practical tests and many observations under varying conditions, when both said companies were in operation, and also when only one was being operated, from all of which, together with an intimate study and knowledge of the topography, proximity, water courses, air courses, and height of stacks at which point sulphur dioxide is emitted from the respective smelters, he is positive that whatever damage results to the south of the Georgia line from smelting operations in Ducktown Basin is attributable entirely to operations of the Tennessee Copper Company and that any competent investigation will demonstrate this.

Affiant has no interest in and no connection with either of said companies.

WM. M. BOWRON.

Sworn to and subscribed before me on this the 17th day of February, 1914.

M. O. CATE, Notary Public.

EXHIBIT E.

Atlanta, Ga., Sept. 27, 1913.

The Ducktown Sulphur, Copper & Iron Company, Limited,
Isabella, Tennessee.

Gentlemen: On the 12th and 13th of this month we visited your plant at Isabella, Tennessee, where we were afforded by your capable and courteous management every facility for a thorough examination of the plant and its workings. We will not undertake to describe the plant in detail. Sufficient to say it consists mainly of a pyritic copper smelting plant, the fumes from which are passed into a large and well designed sulphuric

acid works, of over a million cubic feet capacity, equipped with Glover and Gay Lussac Towers, fan systems and all modern appliances for the conversion of the sulphurous gas produced in your smelter into merchantable Sulphuric Acid. The acid plant during our visit was in splendid condition, condensing into Sulphuric Acid virtually all of the Sulphur Dioxide Gas passing into the system.

The question before us being the quantity of Sulphurous Acid Gas or Sulphur Dioxide which escapes into the atmosphere without being condensed into Sulphuric Acid, becomes a simple matter of ascertaining from your records the quantity of sulphur charged in your ore in a given period, the quantity of sulphur contained in the finished acid produced and shipped, the quantity of sulphur remaining in an inert condition in the slag, matte, flue dust, etc., during the period referred to; then by making the proper credits and deductions we will ascertain the amount of Sulphur Dioxide Gas escaping into the atmosphere. We present the following figures as obtained from the records in your office:

The total amount of sulphur delivered daily to the furnaces, according to the figures given us is 140,346 lbs. Of this amount we can account for 108,356 lbs. leaving a balance of 32,090 lbs. not accounted for. Of the sulphur not accounted for above, 1,325 lbs. escapes from the chamber exit leaving 30,738 lbs. to escape from the furnaces per day. The following figures give our calculations: Average charge to furnaces for the months of June, July and August, 1913, covering a period of ninety-two days.

Mary Mine:

134,580.55 tons = 375.87 tons daily, 16.87% S. = 126,818 lbs.
92 days. Sulphur.

East Tennessee Mine:

3,380.75 tons = 36,747 tons daily, 12.08% S. = 8,878 lbs.
92 days. Sulphur.

Isabella Mine:

716.7 tons = 7.79 tons daily, 29.85% S. = 4,650 lbs.
92 days. Sulphur.

Total amount of sulphur charged to furnaces daily, 140,346 lbs. Sulphur.

SULPHUR ACCOUNTED FOR.

Sulphuric acid produced, 284,680 lbs., 60°, Be'.=72,193 lbs. Sulphur.

Low slag, 840,000 lbs. containing 1,308% S.=10,997 lbs. Sulphur.

High slag, 168,160 lbs., containing 1.53% S.=2,572 lbs. Sulphur.

High Matte, 27,961 lbs. containing 22.57% S.=6,310 lbs. Sulphur.

Flue dust, 15% of 840,800 lbs. ore=126,120 lbs., dust containing 10.5% sulphur=13,330 lbs. Sulphur.

Mud daily 14,000 *lbs.*

H_2SO_4	31.65%=4,431 lbs.	32.65% S.=	1,446 lbs.	Sulphur.
$ZnSO_4$	45.52%=6,372 lbs.	19.97% S.=	1,266 lbs.	Sulphur.
$PbSO_4$	4.39%= 574 lbs.	10.56% S.=	60 lbs.	Sulphur.
$CaSO_4$	1.02%= 143 lbs.	23.53% S.=	33 lbs.	Sulphur.
$CuSO_4$	.63%= 88 lbs.	20.07% S.=	17 lbs.	Sulphur.
$FeSO_4$	.54%= 75 lbs.	21.05% S.=	15 lbs.	Sulphur.
A_1SO_4	.45%= 63 lbs.	28.00% S.=	17 lbs.	Sulphur.

Total amount of sulphur accounted for, and not escaping in the atmosphere..... 108,256 lbs. Sulphur.

Resume

Total Sulphur Charged to Furnaces		140,346 lbs.
Total Sulphur accounted for, not discharged to atmosphere	108,256 lbs.	
Chamber exit losses	1,352 lbs.	
Balance lost from furnaces	30,738 lbs.	
	140,346 lbs.	140,346 lbs.

Recovery, 54.128 tons= 77,135%

Loss from Chamber Exit ..... .676 tons
Loss from furnaces ..... 15.369 tons
} =22.865%

100.000%

In the above statement, we have given you credit for every item to which we felt you were entitled. Your management at

the works brought up the question of free sulphur in the ore and of sulphur volatilized in the furnaces, but not oxidized and also of sulphur in combination with zinc.

As we see it, we cannot give you any credit for this free sulphur or for any sulphur combined with zinc unless they be present in the flue dust and in the mud. Any free sulphur going to the chambers would be oxidized at once and converted into sulphur dioxide. Also any escaping from the furnaces would be oxidized and pass into the air. As to the zinc whilst there is much of this in the ore, it is deposited largely in the flues and what passes through the flues goes into the chambers where it is converted into zinc sulphate; this dissolves in the acid and is credited as sulphuric acid. We have given you full credit for the total sulphur contained in the flue dust and mud, where, in our opinion, any free sulphur or zinc combined with sulphur would be, and although this extra sulphur which you claim in an inert state would amount to several thousand pounds of sulphur dioxide daily, we do not see our way clear to allow this claim.

We have then a total of 32,090 lbs. of sulphur which is equivalent to 64,180 lbs. of sulphur dioxide gas, which is the average escape into the atmosphere for a period of one day during the 92 days comprising the months of June, July and August, 1913, that period of the year during which it is claimed the greatest damage to vegetation occurs. We will say that whilst in the immediate vicinity of the plant the presence of sulphur dioxide was quite noticeable, yet at a distance of approximately a quarter of a mile to the east of the plant in a house located on a hill, where we passed the night with the wind blowing from the plant directly in line with us we could not notice the presence of the gas when sitting on the porch or in our bed rooms with windows open all night. The vines growing on the porch of this house were green and flourishing, but we did notice that some of the leaves were scorched and partly shrivelled; whether this was the result of the action of the fumes or of insects and drought is doubtful.

Whilst the whole country in the immediate vicinity is desolate and denuded of vegetation a condition produced in past years by the practice of roasting ore in the open air, we

noted that wherever an effort has been made to plant grass or flowers in the yards of the residents in the immediate neighborhood, these efforts have been rewarded—with success. In a number of such places, we noted grass, flowers and vegetables growing luxuriantly almost within the shadow of the plant.

Your plant is located in a comparatively low spot, the tops of the furnaces from which most of the unused gas escapes being very much below the level of the surrounding hills. A bold stream or creek flows at the very base of the plant and doubtless a considerable quantity of escaping gas naturally follows the channel of this stream, and owing to the great affinity of sulphur dioxide (SO_2) for water is absorbed therein and carried away in the stream.

Owing also to the fact that the origin of the gas is down in this low basin, the law of diffusion has a better chance to operate between the point of origin of the gas and the Georgia line than if all the gas were emitted from a tall stack on top of a high elevation. The gas being emitted in a basin by virtue of its superior specific gravity (2.24 air being taken as one) tends to spread out over and flow down the valleys and creep up and over the sides of the hills, thus exposing a wide surface for the action of the winds which sweep down upon it and carry it upward, and thus diffuse it through the atmosphere, so that by the time this gas reaches the Georgia line its diffusion into the general atmosphere must be very thorough, that portion of course being left behind which has been absorbed by the stream and by the soil locally, and the percentage present in the air must be infinitessimal.

In order to show how very small it is let us assume that all of the escaping gas is driven from the plant in the direction of Georgia and is confined in an area represented by a geometrical figure having its apex at the plant, its base line say only five miles along the Georgia line, the distance from the apex to the base being approximately three and one-half miles and the height of the upper base line running parallel with the Georgia line being three hundred and twenty-five feet above the lower base line. By applying the rules of mensuration, we find that the cubic contents of this figure would be 52,852,800,000 cubic feet; that is to say, we should have that number of cubic

feet containing 32,090 lbs. of sulphur or 64,180 lbs. of sulphur dioxide gas. But that would be the amount which had accumulated there in 24 hours. In *one* hour 2,674,178 lbs. would accumulate. Now we learn from the statistics of the Weather Bureau that the lowest velocity of the wind on a calm, quiet hot day is 2½ miles per hour, therefore the air and gas in this imaginary geometrical figure would be removed 2.142 times per hour and we should have $\frac{52,852,800,000 \times 2.142}{2674.178} = 42,334.765$ cubic feet. That is to say we should have 42,334.8 cubic feet of air containing one pound of sulphur dioxide, or 6,047.8 cubic feet containing one grain of sulphur dioxide, but 6,047.8 cubic feet of air will weigh 3,414,599 grains so we should have at that point on the Georgia line a mixture of gases containing 1 part of sulphur dioxide to 3,414,599 parts of air, a greater dilution than is claimed to be injurious by 3.4 times.

But this calculation is based on the lowest velocity of the wind the AVERAGE velocity obtained at the Atlanta station is 11.4 miles per hour and by using this factor in our calculation we find the composition of the air on the Georgia line when the wind is blowing at its average rate per hour to be 1 part of sulphur dioxide to 15,570,571 parts of air, or a far greater dilution than has ever been claimed to be injurious.

As a matter of fact, the dilution would doubtless be even more than this since we have only assumed at the base of the figure a height of 325 feet or that of the stack of the Tennessee Copper Company with the height constantly diminishing as we approach your plant until it reaches zero at the apex, or the plant itself, whereas the condition for diffusion are perfect and the gases will doubtless have diffused and been carried up towards a much greater average height before reaching the Georgia line, and part of them necessarily absorbed by the streams and soils locally before reaching this point, furthermore if we follow the gases across the Georgia line, the apex of our original imaginary geometrical figure would now be represented by a straight line 5 miles long at its base and paralleled by a similar line 325 feet above it so that, from that point onward even for a very few hundred feet, the dilution would become so gigantic as to stagger the imagination and the striking of a

sulphur match in the open air would doubtless generate more sulphur dioxide in the immediate vicinity than could be found by the most delicate tests in an atmosphere so diluted.

SULPHUR DIOXIDE PRODUCED BY THE COMBUSTION OF COAL.

It is conservatively estimated by those who are in a position to know that the annual consumption of coal in Atlanta for all purposes is from 450,000 to 475,000 tons. This coal carries approximately an average of 2% sulphur. Let us take on a very low estimate 300,000 tons per annum for Atlanta's consumption, which would give us at 2% sulphur contents 6,000 tons of sulphur per annum, or 16,438 tons daily equivalent to 32,876 lbs. of sulphur or 65,752 lbs. of sulphur dioxide daily thrown into Atlanta's atmosphere from its numerous stacks and chimneys.

We have here a striking illustration of the law of diffusion of gases exerting its benign power and so effectively diffusing and diluting this noxious gas that its pungent odor is not even perceived in the atmosphere by the most delicate sense of smell. That it does no injury to vegetation under these conditions of extreme attenuation is well attested by the beautiful parks and trees and lawns, as well as by the flower and vegetable gardens of the city of Atlanta and its environments. It will be seen however that the total amount of sulphur dioxide generated in the heart of Atlanta exceeds somewhat, even with the very conservative estimate of 300,000 tons annual consumption, the total amount discharged into the atmosphere from your Ducktown plant at a distance of 3½ miles from the Georgia line.

Other manufacturing cities produced much greater quantities of sulphur dioxide than the city of Atlanta; thus it has been estimated by an eminent authority that in the city of Cleveland, Ohio, more than 80 tons daily of sulphur, or 160 tons of sulphur dioxide are discharged into the atmosphere, and yet that city is famous for its beautiful parks and gardens.

In concluding this report, we desire to express our conviction that you have solved satisfactorily a most difficult industrial problem. Handicapped by the at one time apparently insuperable obstacles of a gas coming from your smelting furnaces,

poor in sulphur dioxide and containing considerable percentages of carbon-dioxide, and carbon-monixide, also elements producing large quantities of a very fine impalpable dust, you have as pioneers in an untried field by the employment of brilliant engineering talent, and the unstinted expenditure of money overcome in the simplest and most practical manner possible these great difficulties and built a plant which is a model of its kind and which should be carefully studied by all others having similar obstacles to overcome.

Allow us to congratulate you on having successfully abated, so far as you are concerned, the nuisance which at one time existed, and also upon your notable contribution to the cause of science and civilization.

Respectfully submitted,

J. M. McCANDLESS,
Consulting Chemist.

PETER S. GILCHRIST,
Consulting Engineer.

EXHIBIT F.

State of North Carolina,
County of Mecklenburg.

Personally appeared before the undersigned authority, Peter S. Gilchrist, who made oath in due form of law, that he is a consulting and constructing chemical engineer, with headquarters at Charlotte, North Carolina, of long experience in the construction, manufacture, study and supervision of sulphuric acid plants, and whose special work for many years has required him to study the condensation of noxious fumes and the construction of acid chambers in this connection, and the reduction of fumes from copper smelting and other manufacturing plants yielding noxious fumes.

Affiant is familiar with the design and construction of the combined smelting plant and sulphuric acid plant of the Ducktown Sulphur, Copper & Iron Company, Limited, located in the Ducktown Basin, in Polk County, Tennessee. Likewise, with the plant and operations of the Tennessee Copper Company, located some two and one-half miles southwardly and that distance nearer the Georgia line than the plant of the Ducktown Sulphur, Copper & Iron Company.

Affiant, in connection with J. M. McCandless, a consulting chemist, formerly chemist to the State of Georgia, was requested

in September, 1913, to visit the section where said smelting plants operate, take observations and make report as to whether the operations of said Ducktown Sulphur, Copper & Iron Company, Limited, in any wise injuriously affected territory south of the Georgia line.

Affiant and said McCandless, both of whom were previously familiar with the plants, methods of operation, and territory, went again to the Ducktown section, reviewed and again studied the situation, and as the result of their knowledge and labors, prepared and signed a truthful report and conclusions, copy of which is appended below, and which affiant verily believes is true, in substance and in fact, and which can readily be verified by both practical and scientific investigation.

Affiant is fully convinced that any damage whatsoever which results from smelting operations as carried on in the Ducktown Basin, as respects Georgia territory, is attributable entirely to the Tennessee Copper Company and that any competent investigator, or board of inquiry studying the conditions and circumstances pertinent, will so report.

Said J. M. McCandless is a most capable chemist and a man of high standing throughout the State of Georgia and the South. Affiant is informed that he is at present, and for some months has been, traveling on the Pacific Slope for his health, and that for this reason, his affidavit to the said report may not be procured. PETER S. GILCHRIST,

Sworn to and subscribed before me on this the 10th day of February, 1914. DUNCAN P. TILLETT,

Notary Public, Mecklenburg County. North Carolina.

EXHIBIT G.

State of Tennessee,
Knox County.

S. M. Bain, being duly sworn, says: I am a botanist, at present Professor of Botany in the University of Tennessee, and Botanist of the Tennessee Agricultural Experiment Station, which post I have held, beginning as Assistant, for over twenty years. I am also a collaborator of the United States Department of Agriculture. In my work as Botanist of the Tennessee Experiment Station I have made fundamental contributions to the Science of Plant Physiology my most important work being

on the action of copper compounds on plants. This work is recognized as a standard authority in this country and Europe. I have for twenty years in my official duties been in constant touch with the plant diseases of this region, and have had frequently to diagnose such diseases, and to discriminate between them and insect injuries. My scientific work has been recognized by election to membership in a number of scientific societies, among them the following: Fellow American Association for the Advancement of Science; Member Royal Society of Arts, England; Associe libre de l'Academie internationale de Geographie Botanique; Member American Phytopathological Society, etc.

I have as an authority on Botany and Plant Pathology given popular lectures on these subjects before various educational institutions, among them two lectures at the University of Georgia, Summer School, in 1912, and before the Georgia Breeders' Association, at Athens, in 1913.

In addition to my general training and experience as a plant pathologist I have thus given special attention to the general subjects of toxicology as applied to plants, and of smelter fumes in particular. I have studied with care the more important German publications on the effect of smoke on plants, and am conversant with the general results of these fundamental investigations.

On September 13th, 1913, I began a careful investigation in the region about Ducktown, Tennessee, of the condition of timber and other vegetation, with the special object of determining whether there was at that time, or had been previously to that time, any damage to such vegetation by smelter fumes from the works of the Ducktown Sulphur, Copper & Iron Company. I have since said date spent in actual field investigation in the region aforesaid about twenty-four days, and considerable additional time in the laboratory study of various exhibits collected in said region. In my itinerary I covered much of the territory in Fannin, Murray and Gilmer Counties, Georgia, touching the Tennessee-Georgia State line at various points from the North Carolina boundary westward to the Alaculsy Valley, seventeen miles more or less, and dipping southward into Georgia several miles at various points. On said itinerary I very carefully and critically examined all vegetation that appeared in the least to arouse suspicion of smoke injury or other and natural diseased conditions. As to the then aspect

of vegetation, forest trees, and agricultural crops, I found no external evidence of a diseased condition other than such as may be found in any similar region, and due to natural causes, such as fungus diseases and insect pests, or to forest fires and unfavorable season. I found among other natural diseases that white pine trees are dying from some obscure disease presenting exactly the same symptoms as are shown by the same disease which I found in Sevier County, Tennessee, a few days later at a distance of nearly 100 miles north of the Ducktown region.

By far the most accurate method I could avail myself of in the solution of the points at issue was to take blocks out of trees suspected to have suffered from smelter fumes, and to determine the rate of growth as indicated by the annual rings. It is a well established fact that all our ordinary trees form a distinct layer or cylinder of wood each year, and that by careful counting the exact age of the tree can be determined. Not only this, but the relative thickness of the ring of wood formed in any definite growing season is determined by the favorable or unfavorable conditions surrounding that tree during that season. Any strikingly unfavorable condition, such as drouth, insect attack, forest fire, or poisonous fumes, must and does result for that season in the formation of a thin growth ring. This method for determining the existence of smoke injury in the vicinity of industrial establishments, has been in successful use in Germany for at least twenty years. By the use of an instrument known as the increment borer I was able to remove a small core from a number of trees in the region in question, and with the additional data furnished from chips cut out, and from freshly cut stumps I found this method revealed in an astonishing manner the smoke history of the Ducktown region.

Some individual trees of any particular species are able to withstand the action of smelter fumes for many years, and may not reveal in the external appearance of their foliage any indications of smoke injury, but their annual rings will often show retardation of growth, and hence injury where it had not been suspected.

This method of investigation gave results tallying exactly with the smoke history of the region as it was told to me by the

officials of the Ducktown Sulphur, Copper & Iron Company. Many trees were thus examined, and care taken in every instance to select trees most exposed to air currents leading from the works of the defendant company, and the following conclusions were drawn:

1st. By far the greater amount of damage from smelter fumes in said region began not prior to 1906, the reputed date of the erection of the high stack of the Tennessee Copper Company.

2nd. A number of trees show improved growth condition, especially during the years 1911 or 1912 and 1913, attributable to the operations of the acid plant of the Tennessee Copper Company.

3rd. An occasional tree shows growth checks from 1901, the reputed date of the establishment of the plant of the Tennessee Copper Company.

4th. An occasional tree shows a growth check from 1894 to 1898, improved growth from 1899 to 1900, with still greater checks from 1901. This is accounted for by the reputed operation of the Pittsburg Copper Company from 1894 to 1898, to the cessation of fumes in the region from 1899 to 1900, and to the reappearance of these fumes on the reputed establishment of the Tennessee Copper Company's plant in 1901.

5th. I found out of over two hundred trees examined in this region only one whose growth checks could possibly be interpreted as indicating any injury by fumes generated by the Ducktown Sulphur, Copper & Iron Company between 1891 and 1900. This single case was doubtful, and its slight growth check may have been due to some other cause.

6th. These facts attested by the trees themselves appear to me to show that the lifting of fumes by the high stack of the Tennessee Copper Company, said to have occurred in the Spring of 1906 is responsible for by far the greater amount of damage to vegetation in that portion of the State of Georgia adjacent to the Ducktown Copper Region. This effect of high stacks in extending the zone of injury by smelters is recognized by the highest German authorities.

The Tennessee Copper Company has much the larger plant and is located within about a quarter of a mile of the Georgia State line with no hills intervening, while the plant of the

Ducktown Sulphur, Copper & Iron Company is full three miles north of said State line and releases its fumes from a low stack within a valley separated from the Georgia line by a range of hills extending above the top of its stack.

While I have been able after the aforementioned careful examination to find no evidence of injury to vegetation within the State of Georgia from fumes produced by the Ducktown Sulphur, Copper & Iron Company during the period when it operated alone, even granting the possibility of slight damage during that period immediately adjacent to the Tennessee line, within Georgia it amounts to a practical certainty that at the present time said Ducktown Sulphur, Copper & Iron Company is not responsibile for any damage to vegetation in the aforesaid region because of the operation of its acid plant, now said to be greatly reducing its output of sulphur fumes.

S. M. BAIN.

Sworn to and subscribed before me this 20th day of February, 1914.

WM. H. EAGLE,
Notary Public.

EXHIBIT H.

State of Tennessee,
Knox County.

C. W. Renwick, affiant, makes oath:

That he became general manager of the Ducktown Sulphur, Copper & Iron Company, Limited, in 1910, and so continues to the present. He became actively connected with said company in 1899, and has continued with it since.

That he is intimately acquainted with its smelting operations in detail, ore smelted, output and sulphur content of the ores; that the tonnage smelted during the years 1906-7 was as great, if not greater, than during subsequent years, and up to the present. That the sulphur content of the ores has gradually reduced, and at present the sulphur content of the ores smelted is about 75% of what it was in 1906-7.

That the smelter plant is located now as it was in 1906-7, about the same height of stack and the method of smelting is the same.

About June, 1909, the said company had completed and put into successful operation a sulphuric acid plant for the recovery and conversion of the sulphur content yielded by the

ores smelted. The same has been continuously operated since and emits from the stack approximately 15% of the sulphur. The details thereof are shown in the report of Peter S. Gilchrist and D. J. McCandless, filed as an exhibit herewith. The said acid plant cost several hundred thousand dollars and is of the most approved and modern design.

Affiant is acquainted with the smoke zone or radius effected by the smelting operations of said company prior to the beginning of operations by the Tennessee Copper Company in 1901. Said smoke zone at that time was confined to the Ducktown basin, and did not noticeably extend into the State of Georgia. The company of which affiant is manager began operations with its present plant in 1891, and has continuously operated to the present in substantially the same manner—except that about 1902 it changed from open heap roasting of the ore to pyritic or green smelting. During all this time the said Ducktown Company has made only a matte of approximately 50% copper, and said matte contains about 24% copper. Since the Tennessee Copper Company operations began it has refined its product, yielding a copper pig in excess of 99%, and the sulphur content in its ore has been correspondingly eliminated.

Said Tennessee Copper Company in the spring of 1906 put into practical operation a stack 325 feet tall and has continued the same to the present, the sulphur fumes being expelled therefrom. The difference in altitude at point of emission is about 195 feet, the top of the stack of the Ducktown Company being that distance lower than the top of the stack of the Tennessee Copper Company.

Shortly after the passage of the Legislative Resolution by the State of Georgia in 1913, affiant, on behalf of said company and through its general counsel, in an effort to prevent litigation and further an amicable inquiry, proposed to the Governor and Attorney General of Georgia that a body of scientists or a commission from one or more universities of the country be engaged to investigate and report as to whether or not the operations of the Ducktown Company were doing substantial injury within the State of Georgia—and that the Ducktown Company would bear the expense of this investi-

gation, if the Georgia officials would agree to accept and abide result of such investigation. The Georgia officials felt the resolution aforesaid was mandatory, and therefore they could not agree, assent to or participate in the investigation proposed.

All friendly overtures of this nature being declined, affiant then engaged D. J. McCandless, formerly State Chemist of Georgia, a man of attainment and high standing throughout the southern country, in company with Peter S. Gilchrist, to investigate and report on existing conditions, and has examined their report herein exhibited and believes the same substantially correct. Said McCandless is now traveling in a distant State, and presence cannot be procured at this time to verify said report.

From affiant's long and practical experience and intimate knowledge of local conditions at said plant, he is convinced no injury is done thereby to any territory south of the Georgia line.

C. W. RENWICK,

Sworn to and subscribed before me on this the 20th day of February, 1914.

J. PIKE POWERS, JR.,
Notary Public.

EXHIBIT I.

State of Tennessee,
Knox County.

W. B. Miller, being sworn, says he is and for a number of years has been engaged in the practice of law at Chattanooga, Tennessee, and for some four years has been general counsel for the Ducktown Sulphur, Copper & Iron Company, Limited, operating a combined copper smelting and sulphuric acid plant at Isabella, Tennessee, in the Ducktown Basin, in Polk County.

Affiant has had frequent occasion to appear on behalf of said company in the defense of actions brought against it claiming damages to timber and crops, covering periods both prior and subsequent to the installation of its acid plant.

During the December term, 1913, of the United States District Court at Chattanooga, Tennessee, before Honorable Edward T. Sanford, Judge, and a jury, we tried two of said suits, wherein J. P. Vestal and J. H. Vestal were plaintiffs, said

cases being numbers 1099 and 1098 respectively, and wherein said plaintiffs claimed damages aggregating $37,500.00. Said causes were, by consent of counsel, consolidated and tried together. The plaintiffs, owners of lands lying along the line between the states of Tennessee and Georgia, maintained that timber growing on said lands had been substantially damaged as result of operations by said company during a period dating from February 4th, 1908, to the 20th of May, 1910. It was agreed by counsel on said trials that the acid plant of said company went into practical operation in June, 1909. Consequently, the period under investigation covered operations both prior and subsequent to the installation of said plant. Plaintiffs' counsel during the trials aforesaid were most capable, of splendid attainment and high repute. The jury was composed of substantial men, chiefly of the agricultural class.

A verdict was returned in favor of defendant company in both cases, and copies of the verdict and judgment of the Court are hereto attached.

There was no appeal from the jury's finding, and the judgment is final.

Affiant has read the affidavit of C. W. Renwick setting forth friendly efforts to have the State of Georgia submit to a competent and scientific investigation touching the operations of above company and of the Tennessee Copper Co. with a view of either fixing liability or confirming non-liability as against the Ducktown Sulphur, Copper & Iron Company, Limited; and of his own knowledge states that such overtures as detailed in the affidavit of said C. W. Renwick are truthfully stated, as personally known to affiant who participated in the making of such friendly overtures.

W. B. MILLER.

Sworn to and subscribed before me on this the 20th day of February, 1914.

J. PIKE POWERS, JR.,
Notary Public.

EXHIBIT J.

Be it remembered that at a District Court of the United States begun and held for the Southern Division of the Eastern

District of Tennessee, at the Court Rooms in the city of Chattanooga, within said District and the Sixth Circuit, on the second Monday, it being the tenth day of November, A. D. 1913;

Present and presiding the Honorable Edward T. Sanford, Judge of the United States District Court for the Eastern and Middle Districts of Tennessee.

Among the proceedings had were the following, to-wit:

Friday, December 12, 1913; court met pursuant to adjournment, present and presiding the Honorable Edward T. Sanford, Judge, Etc.

J. H. Vestal
v.
Ducktown Sulphur, Copper & Iron Co., Ltd.

No. 1098
At Law.

Consolidated Causes.

and

J. P. Vestal
v.
Ducktown Sulphur, Copper & Iron Co., Ltd.

No. 1099.
At Law.

Came the parties by their attorneys and came also the same jury as upon yesterday, who having considered of their verdict, upon their oaths do say they find the issues joined in favor of the defendant and against the plaintiffs.

Friday, February 6, 1914; Court met pursuant to adjournment, presiding at Chambers, The Honorable Edward T. Sanford, Judge, Etc.

J. H. Vestal
v.
Ducktown Sulphur, Copper & Iron Co., Ltd.
and

No. 1098

Consolidated Causes.

J. P. Vestal
v.
Ducktown Sulphur, Copper
& Iron Co., Ltd.

No. 1099.

In these cases, upon the verdict heretofore rendered, it is considered by the Court that the above defendant have and recover of the plaintiffs and their sureties on cost bonds all costs hereof. Execution will run against J. H. Vestal and his sureties on his prosecution bond for only such portion of the costs of this consolidated litigation as accrued at his instance, and for the remainder of the costs execution will run against J. P. Vestal and his sureties.

It is further considered that plaintiff's suits be dismissed and that the defendant go hence.

Feb. 5, 1914. Approved for entry.

SANFORD, Judge.

O. K. W. B. MILLER, for Deft.
J. B. SIZER, for Pltff.

I, Horace Van Deventer, Clerk of the United States District Court for the Southern Division of the Eastern District of Tennessee, do hereby certify that the foregoing two pages are full, true and correct copies of the final verdict of the jury and the judgment thereon in the cases of J. H. Vestal v. Ducktown Sulphur, Copper & Iron Co., Ltd., and J. P. Vestal v. Ducktown Sulphur, Copper & Iron Co., Ltd., consolidated causes, as the same appear on file and of record at office in Chattanooga.

Witness my hand and the seal of said court at Chattanooga, in said District, this February 17, 1914.

HORACE VAN DEVENTER, Clerk.
By NEWTON AIKEN, Deputy Clerk.

FILE COPY.

Office Supreme Court, U. S.
FILED
APR 6 1914
JAMES D. MAHER
CLERK

Supreme Court of the United States

October Term, 1913

No. 1, Original

IN EQUITY

The State of Georgia,
Complainant,

vs.

The Tennessee Copper Company, and
The Ducktown Sulphur, Copper & Iron
Company, Limited.

Brief of argument for the State of Georgia on its motion to enter a final decree against The Ducktown Sulphur, Copper & Iron Company, Limited.

THOMAS S. FELDER,
Attorney General of Georgia.

SUPREME COURT OF THE UNITED STATES.

October Term, 1913.

No. 1, ORIGINAL.

THE STATE OF GEORGIA, Complainant, *vs.* THE TENNESSEE COPPER COMPANY AND THE DUCKTOWN SULPHUR, COPPER & IRON COMPANY, LIMITED,	IN EQUITY.

Brief of Argument for the State of Georgia on its Motion to Enter a Final Decree Against The Ducktown Sulphur, Copper & Iron Company, Limited.

A final hearing was had in this case, the issues were found by the Court in favor of the complainant, the State of Georgia, and the following order was entered in the cause:

> "This cause came on to be heard on the pleadings and proofs and was argued by counsel. On consideration whereof, it is now here ordered, adjudged and decreed by this Court that an injunction be, and the same is hereby, awarded as prayed. It is further ordered that the complainant may submit a form of decree on the coming in of the Court in October next. May 13, 1907."

On the coming in of the Court at the term following the entering of this order, the complainant, instead of submitting a form of decree, presented a motion to post-

pone the entry of the decree of injunction until the further application of the complainant, if such procedure could be had without surrendering any of the rights of complainant. For the convenience of the Court we copy the application, omitting the formal parts:

"Comes the State of Georgia, by John C. Hart, its Attorney-General, and respectfully represents unto the Court:

"1. That on the thirteenth day of May, 1907, this honorable Court delivered an opinion in the above-stated case, declaring, among other things, that 'if the State of Georgia adheres to its determination, there is no alternative to issuing an injunction, after allowing a reasonable time to the defendants to complete the structures they are now building, and the efforts they are making to stop the fumes. The plaintiff may submit a form of decree on the coming in of this Court in October next.'

"2. While the State of Georgia does stand upon her rights and adheres to her determination that the fume injury within her territory shall be remedied, it is not the desire of the State of Georgia to unduly press her rights for injunction in the premises.

"3. The defendants have represented to the State of Georgia that, as speedily as possible, they are installing extensive and new plants and devices to remedy the matters complained of in this cause, and that, by reason not only of the magnitude of the work, but the fact that the appliances are in a measure experimental, and along new lines, rebuilding, changes and alteration are required, and because of other delays, it will be impossible to fully install devices to remedy the evil complained of by the date set for the presentation of the decree herein.

"4. That by reason of these representations, the Legislature of the State of Georgia passed a resolution, approved the 27th day of July, 1907, which was as follows:

'No. 1.

'A joint resolution in relation to the case of the State of Georgia, by its Attorney-General, John C. Hart, vs. Tennessee Copper Company et al.

'WHEREAS, The Attorney-General did heretofore institute, in pursuance of authority of and direction by the Legislature of the State of Georgia, an original petition in the Supreme Court of the United States, said cause sounding State of Georgia, by its Attorney-General, John C. Hart, vs. Tennessee Copper Company et al., and having for its purpose the protection of the public domain from injury and destruction caused by poisonous fumes resulting from the smelting of copper ores at Ducktown and Isabella, Tennessee, by the said defendant Copper Companies; and

'WHEREAS, Said cause has since been passed upon by the Supreme Court of the United States adjudging the State of Georgia, in her sovereign right, was entitled to the injunction prayed for, and if she insisted upon her right it is the duty of the Supreme Court to enter a decree accordingly, after giving to the Copper Companies a reasonable time within which to install sulphuric acid plants or other appliances for eliminating the poisonous or injurious qualities of said fumes; therefore, be it

'*Resolved*, By the General Assembly of the State of Georgia, That the State of Georgia, through her Attorney-General, insist upon her right to a final decree against an indefinite continuance of the injuries to her public domain by the operation of said companies, but, recognizing and fully realizing the vast interests involved to the Copper Companies and to the people dependent thereon, the State of Georgia feels that she should act in a spirit of wisdom, justice and moderation, and having every confidence in her Attor-

ney-General, the matter of final procedure is left entirely to his discretion, we recommending that he proceed liberally in the matter, to the end that no unnecessary hardship shall be imposed upon the Copper Companies, and that no unnecessary time shall be allowed them to complete the structures that they are now building to stop the fumes, to the damage and injury of the citizens of Georgia and to her public domain.

'Approved July 27, 1907.'

"5. The Attorney-General of the State of Georgia during the last week of September, 1907, made a personal inspection of the plants and works of the defendants and found the representations of the defendants as to the installation of new devices and appliances and the magnitude of such undertaking to be true, and that immediate issuance of injunction would work a hardship upon the defendants and their employees and dependents, which might be avoided by the allowance of additional time.

"6. The State of Georgia is willing that further time, and until application of her Attorney-General herein, be allowed to the defendants to install their new plants and devices, provided complainant by such allowance shall lose none of her rights in the premises, and that by future application to this honorable Court, the decree provided under the opinion herein may be entered, or, if entered previously, may become operative and final upon the Attorney-General's application.

"Wherefore, complainant respectfully asks, if such procedure meets with the approval of this Court, that appropriate order be entered preserving complainant's full rights herein, but postponing the entry of decree for injunction until further application by complainant, due notice thereof to be given to defendants, or that a decree be entered in blank, which complainant is prepared to submit, to become operative and effective upon application,

after due notice by complainant, as the Court deems proper; otherwise that immediate decree be entered as provided for by the opinion of May 13, 1907, of this honorable Court."

Upon this application the following order was entered:

"On consideration of the motion to postpone the entry of final decree in this cause, it is now here ordered by the Court that the time to present the form of the final decree to be entered herein, be, and the same is hereby, enlarged as counsel may be advised, without prejudice, and on due notice. October 28, 1907."

As we view the present status of this case, there is nothing open to the Court but the framing and entering of the decree of injunction against the Ducktown Sulphur, Copper & Iron Company, Limited, the complainant having submitted a form of decree and moved that it be entered, and given due notice in accordance with the foregoing orders. The form submitted follows the prayers of the bill, and is in conformity with the opinion and order of the Court. The Court found that the complainant was entitled to the injunction and the same was awarded to it "as prayed for." If the form which we submit is not in proper language, it can be made so. At any rate, the complainant is entitled to have the final decree of injunction entered against the Ducktown Sulphur, Copper & Iron Company entered on the record as it stands, and without further action or hearings by the Court. All issues are closed as to this defendant, except the one of the framing of the final decree.

This defendant files objections to the entering of the decree, upon various grounds, none of which, we respectfully submit, have any merit. The main objections which are now urged were insisted on when the case was

heard on its merits, and have been finally disposed of by the Court. The defendant is simply trying to reopen the cause.

The position taken by this defendant that it is entitled to have evidence taken at this time on the right of the State to have its decree of injunction, we respectfully submit, is utterly without merit. The State of Georgia is in the same position now as she was on the coming in of the Court at the October Term, 1907, at the time she was directed to submit a form of a decree to be entered in the cause. Her rights have been protected by an appropriate order of the Court. The complainant asked for the delay in which to present a decree to the Court, not as a favor to itself, but out of grace to the defendants. The State was but pursuing the policy which she has adopted and followed in all her dealings with these two copper companies, that of liberality and moderation, and with the desire to insist on her full rights only as a last resort, and when all of her efforts had failed to protect her territory and citizens from damage.

This defendant in its brief contends that the decree now proposed is a nunc pro tunc one, and that it should not be granted as a matter of right, but that its allowance is within the discretion of the Court. We submit that the order is in no way nunc pro tunc. It has none the features of a nunc pro tunc order. It is not to correct any error, nor is its purpose to take the place of any order which was erroneously rendered or neglected to be entered. If the decree is entered as now proposed it will in no way be retrospective, but will take effect only from the time of its entry.

See 5 Words & Phrases, p. 4868.

Objection is made to the form of the decree because there are no specific findings of fact therein. We do

not understand that it would be proper for the findings of fact to be recited in the decree. Indeed, it would be against the rules in equity as promulgated by this Court to incorporate such in the decree. Equity Rule 71.

Objection is also made because it is claimed the decree does not point out any specific act which the defendant should refrain from doing. In answer to this criticism we invite inspection of the proposed decree. It follows the prayer of the petition and specifically directs what acts the defendant is restrained from doing.

Mention is made in the objections of the defendant to an Act of the General Assembly of Georgia, passed at its last session, in which the Governor was authorized to enter into an agreement with it for the depositing of a certain sum of money to take care of the current damages to the citizens of the State, similar to an agreement which the General Assembly had authorized the Executive to enter into with the other defendant, The Tennessee Copper Company. While we do not think this resolution has any part in the present discussion, we are perfectly willing for the Court to consider the Act. It is only another evidence of the liberality of the State and the failure of this defendant to appreciate the same. The resolution is reported in Georgia Laws 1913, page 1293. The General Assembly simply gave this defendant the same right which it granted to the Tennessee Copper Company, that is, the option to deposit with arbitrators a named sum to pay current damages to the citizens, the State in this event to allow further time in which the company could pursue its efforts to eliminate the cause of the damage altogether. This defendant saw fit not to avail itself of this privilege, and the State is forced, in order to protect itself and its citizens, to ask that the final decree be entered, and that the relief heretofore awarded by the Court be made effective.

The complainant and the Tennessee Copper Company, at the present term of this Court, presented a motion to make a certain stipulation entered into between them a part of the record in the cause, and prayed as follows:

> "The premises considered, the above named parties respectfully move the Court that the above agreement and stipulation be permitted to be filed and entered and made a part of the record in said cause, and under the terms and conditions of said agreement and stipulation as above set out, that the said cause be continued as to the said Tennessee Copper Company until the October Term, 1916, of this Court, without prejudice to either party."

On this application the Court entered the following order:

> "On consideration of the motion for leave to file a stipulation of counsel for the respective parties herein, and that this cause be continued until the October Term, 1916,
>
> "It is now here ordered by the Court that said motion be, and the same is hereby, granted. October 20, 1913."

The motion only called for an order continuing the entry of the final decree as against the Tennessee Copper Company, until the October Term, 1916, and did not ask to postpone the entry as to the other defendant, The Ducktown Sulphur, Copper & Iron Company. It may be that the order as passed only does this, as it says that it is "ordered by the Court that the said motion be and the same is hereby granted." But out of an abundance of caution, we have moved that the order be modified so as to conform to the motion on which it was granted.

Objection is made to this by The Ducktown Sulphur, Copper & Iron Company, but we cannot see how the re-

forming of this order will affect this defendant in any way. It was not a party to the motion on which the order was granted, and is in no way concerned in the order which was taken. The Tennessee Copper Company makes no objection to the reforming of the order. We ask for the reformation of the order at the term at which it was granted and at the first opportunity. The order, having been rendered at the present term, is still in the breast of the Court, and of course subject to be changed in such manner as the Court may deem proper.

1 Black on Judgments (2nd Ed.), sec, 305;
Bronson v. Schulten, 104 U. S., 410 (1), 26 L. Ed., 797 (1).

We respectfully insist that the State is entitled at this time to an injunctive decree against The Ducktown Sulphur, Copper & Iron Company, Limited, as a matter of law, and without further testimony or hearings, and that such decree should be in form as the one here submitted.

Respectfully submitted,

THOMAS S. FELDER,

Attorney-General of Georgia.

In

Decem

APRIL

In the Supreme Court of the United States

OCTOBER TERM, 1914.

STATE OF GEORGIA

vs.

TENNESSEE COPPER COMPANY
and
DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED.

APPLICATION OF THE DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED, TO BE PERMITTED TO TAKE PROOF IN REBUTTAL.

To the Honorable The Supreme Court of the United States:

The Ducktown Sulphur, Copper & Iron Company, Limited, respectfully shows to the Court:

1st. The original bill in this cause was filed by the State of Georgia against the Tennessee Copper Company and the Ducktown Sulphur, Copper and Iron Company, Limited, alleging in substance that by emitting noxious vapors from their furnaces, which are located in the State of Tennessee but near the Georgia line, they were causing great damage to the forests, crops and other vegetation

in the State of Georgia, and were polluting the atmosphere, injuring the public roads, etc., in said state, and it was sought therein to obtain an injunction to restrain said Companies from further permitting noxious vapors to escape and pass into the State of Georgia.

The case was heard on affidavits on February 25th and 26th, 1907, and an opinion was handed down on May 13th, 1907, wherein the Court found, in effect, that the defendants were committing a public nuisance in the State of Georgia by emitting from their furnaces used in smelting ores noxious fumes and gases; but the entrance of the final decree was postponed to the October Term, 1907. However, at said term the time to present the form for the final decree was enlarged as counsel might be advised without prejudice, and on due notice.

2nd. At the October Term, 1913, the State of Georgia presented to the Court a motion to enter a final decree against the Ducktown Sulphur, Copper & Iron Company, Limited, on the opinion handed down on May 13th, 1907. After argument said motion was taken under advisement, and on April 13th, 1914, the Court made an order:

(1) Postponing the consideration of said motion until the next term;

(2) Granting leave to said defendant to take additional testimony, to be taken before any officer in the State of Georgia or Tennessee authorized to take depositions by the laws of said States, upon ten days notice to counsel for the complainant, said additional testimony so to be taken to relate solely to the changed condition, if any, which may have arisen since the case was decided, said testimony to be concluded on or before the first day of July, 1914; and

(3) Granting leave to the complainant to take addi-

tional testimony in the same manner, such testimony to be concluded on or before the 1st day of September, 1914; all the testimony taken by both parties to be filed with the Clerk of the Court on or before September 15th, 1914.

3rd. Under the leave thus given, on June 18th to 23rd, 1914, the said defendant took the depositions of witnesses who testified in substance that after the decision of the case on May 13th, 1907, it had expended about $600,000.00 in constructing a plant for the purpose of manufacturing sulphuric acid from the fumes theretofore escaping from its furnace, and thus preventing the escape of noxious vapors therefrom; that said factory was completed in the year 1909, and has been from said date in successful operation; that the percentage and amount of said fumes which it has not been able to prevent escaping is so small that no damage can result therefrom in the State of Georgia; that the plant of the Tennessee Copper Company is very much larger than that of the Ducktown Sulphur, Copper & Iron Company, Limited, and is situated from three to three and one-half miles nearer to the State of Georgia; but that said Tennessee Copper Company also in 1909 constructed an acid plant and has since said date made one or more extensions of its capacity. Defendant also introduced witnesses from different localities in the State of Georgia who testified that during the last few years, especially during the years 1911, 1912, 1913 and 1914 up to the time said depositions were taken, conditions had been very much improved in their respective localities of said State; that smoke fumes had been carried into said sections but few times during said period, and the damages resulting therefrom, if any, were insignificant. Evidence was also introduced as to other matters, which are here unimportant.

4th. Thereafter, from August 12th to 21st, inclusive, the complainant took the depositions of a large number of witnesses who resided in and professed to be familiar with different localities in the State of Georgia, and who specified particular districts wherein they stated smoke containing poisonous sulphur fumes had often come during the years 1911, 1912, 1913 and 1914, by which the forests, orchards and crops in designated sections, and upon designated farms, had been greatly damaged, the principal localities mentioned being Epworth, Jack River section, Ellijay, Ellijay Valley, Carter Cay Valley, Turniptown Mountain, Bushy Head Mountain and surrounding vicinity, the Dora section, Start Creek country, and Morganton and Mineral Bluff vicinities. Some witnesses especially testified to the presence of smoke at Epworth and other sections in Georgia on and about the 12th of May, 1913, and from the 1st to 5th of July, 1914. The reason said dates are especially important is that from about the 4th to the 16th of May, 1913, and from about the 1st to the 6th of July, 1914, the Ducktown Sulphur Copper & Iron Company was operating its furnace, while the furnace of the Tennessee Company was closed for repairs, and the effort was thus made to prove that this defendant was permitting fumes to escape into the State of Georgia which caused said damage.

5th. Because the order entered by the Supreme Court gave no opportunity for introducing proof in rebuttal, this defendant endeavored as best it could to anticipate what complainant might attempt to prove, and hence, as above stated, introduced witnesses to show the condition of the forests, crops, etc., in the Northern part of the State of Georgia during the last few years; but it was impossible for it to anticipate and disprove in advance

the correctness of much of the testimony introduced by complainant. It is claimed, and proof was introduced by complainant tending to show, that damages have accrued in extensive localities in three or four counties of North Georgia. In but very few of said sections did defendant understand after diligent inquiry such claim would be made, and it would have been very expensive and have made a record of enormous proportions to have attempted to anticipate such evidence as to every locality in North Georgia. Furthermore, as to a very material portion of said evidence, it was impossible for defendant to anticipate, because it related to what it was claimed had occurred on dates subsequent to July 1st, 1914, the date upon which the defendant had closed the taking of its proof. For illustration, two experts made a trip through parts of Georgia during the month of August, and but a few days before their depositions were taken, and testified to what they had observed, claiming that the indications were that some of the damages resulting from sulphur fumes were of recent occurrence; and while the taking of testimony was still in progress, they in company with others made another trip through other sections, and were recalled and testified to damages in those sections, much of which they claimed was fresh.

6th. As soon as the taking of proof by complainant had been closed this defendant at once began an investigation for the purpose of ascertaining the true facts as to these several localities, and as to the emission of smoke which passed into the State of Georgia during the periods from May 4th to 16th, 1913, and July 1st to 5th, 1914, and it will be able to prove by the witnesses hereinafter mentioned that in many of the localities mentioned during the years 1911, 1912, 1913 and 1914 there has been prac-

tically no damages arising from smoke fumes to forests, orchards and crops, etc.; that in the other localities the damages resulting from smoke fumes have been very slight, not at all comparable with what they were previous to the construction of the acid plants by both of defendants; that some or all of the orchards which it is claimed in the complainant's evivdence were damaged by smoke fumes have the San Jose Scale, from which and possibly from other diseases the damage proven has arisen, and that from May 4th to 16th, 1913, and from July 1st to 5th, 1914, if any smoke fumes passed into the State of Georgia the quantity was so slight that no damage could have resulted therefrom, and that in fact the vegetation of the sections wherein it is claimed that smoke appeared during said dates was not damaged. It has also had a photographer to take and has had developed a large number of color photographs of the localities which were specially mentioned in complainant's testimony, which photographs show the exact conditions of said places within a very few weeks after it was claimed by witnesses that the forests, crops and orchards therein were greatly damaged, and refute said claims.

Defendant has exercised great diligence in procuring these facts, employing a number of men to make the investigation, and now presents the matter to Your Honor at the first opportunity.

The witnesses by whom this defendant can prove the facts above stated, and the particular localities or matters about which they will testify, are as follows:

J. R. Herren, Ham Holt, Z. V. Kimsey, H. H. Chastain, W. P. Harper, T. N. Bennett, John Boatner, A. H. Pack, I. S. Davis, W. W. Thrasher, M. C. Goss, who will

testify with reference to the vicinity of Epworth and Jack River section;

Linnie Clayton, Jason Akins, A. M. Johnson, M. S. Clayton, J. W. Clayton, B. H. Holt, W. T. Higdon who will testify with reference to the vicinity of Ellijay, Ellijay Valley, Carter Cay Valley, Turniptown Mountain, Bushy Head Mountain and surrounding country;

W. E. Rodgers, J. M. Davis, D. Q. Davis, W. D. Smith who will testify with reference to the vicinity along Toccoa River and Chastain farm, four miles Northeast of Blue Ridge, and especially with reference to the smoke in that vicinity on and about July 3rd, 1914, and other dates as claimed by witnesses for complainant;

Grant Orten, F. E. Garron, John Wilson, Robert Hampton, F. P. Largent, E. L. Stanley, who will testify with reference to Dora section east of Mineral Bluff, and also Start Creek country, and Morganton and Mineral Bluff sections;

The Entomologist of Tennessee, J. W. Clayton and Professor S. M. Bain, who will testify with reference to the diseased conditions of the orchards mentioned by complainant's witnesses and J. H. Quintrell, B. H. Holt and Sherman Reese, who will testify as to where specimen branches of fruit trees were obtained, which were examined by said entomologist and Prof. Bain;

Professor S. M. Bain, James E. Thompson, Sherman M. Reese, who will testify with reference to the taking and development of the photographs, and the localities where taken;

W. F. Lamoreaux, who will testify with reference to the operation of the furnace during May, 1913, and July, 1914.

The witnesses introduced by defendant as aforesaid, testified as to conditions in localities along and near to the State line at points which defendant then believed, and now considers most favorable for showing what damage, if any, had in fact resulted from its operations.

But complainant's witnesses, as above shown, testified to damage which they claim had resulted from smoke in localities many of which are much more remote and secluded than those covered by defendant's evidence.

It will require not more than two or three days to examine said witnesses, or such number thereof as defendant may deem sufficient to rebut the testimony aforesaid offered by complainant, and the evidence will be taken within such time as will suit the convenience of complainant and as may be directed by the Court, so that the final disposition of the case may not be delayed.

The defendant Ducktown Sulphur, Copper & Iron Company, Limited, therefore prays that it be permitted to take the depositions of the parties above mentioned with reference to the matters above set forth.

DUCKTOWN SULPHUR, COPPER & IRON COMPANY, LIMITED,
By C. W. RENWICK.
General Manager.

W. B. MILLER,
J. A. FOWLER,
Sol's for D. S. C. & I. Co., Ltd.

STATE OF TENNESSEE)
KNOX COUNTY) ss.

Personally appeared before me, ROBERT D. TAYLOR, a Notary Public for Knox County, Tennessee, Sherman M. Reese, who makes oath that he is the agent of the Ducktown Sulphur, Copper & Iron Company, Limited, who has had specially in charge the procuring of testimony on behalf of said company in the case of State of Georgia vs. Tennessee Copper Company and Ducktown Sulphur, Copper & Iron Company, Limited, No. 1, Original, in the Supreme Court of the United States, and was present when all the evidence was taken on behalf of both complainant and said defendant, Ducktown Company, and further has supervised the investigation of the facts looking to the taking of the evidence in rebuttal, and that the statements made in the foregoing application are true.

SHERMAN M. REESE.

Sworn to and subscribed before me, this 3rd day of October, 1914.

ROBERT D. TAYLOR,
Notary Public.

[SEAL]

FILE COPY.

Office Supreme Court, U. S.
FILED
OCT 13 1914
JAMES D. MAHER
CLERK

In the Supreme Court of the United States

NUMBER 1—ORIGINAL

OCTOBER TERM. NINETEEN HUNDRED AND FOURTEEN

STATE OF GEORGIA, COMPLAINANT,

VS.

TENNESSEE COPPER COMPANY, AND DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED,
DEFENDANTS.

Objections of the Complainant to the granting of the application of the Defendant, the Ducktown Sulphur, Copper and Iron Company, Limited, to be permitted to take additional proof.

CHAS. P. BYRD, STATE PRINTER

In the Supreme Court of the United States

NUMBER 1—ORIGINAL

OCTOBER TERM. NINETEEN HUNDRED AND FOURTEEN

STATE OF GEORGIA, COMPLAINANT,

VS.

TENNESSEE COPPER COMPANY, AND DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED,
DEFENDANTS.

Objections of the Complainant to the granting of the application of the Defendant, the Ducktown Sulphur, Copper and Iron Company, Limited, to be permitted to take additional proof.

TO THE HONORABLE, THE SUPREME COURT OF THE UNITED STATES:

Comes now the complainant, the State of Georgia, and by leave of the Court first had and obtained, files these its objections to the grant of the application of the Ducktown Sulphur, Copper & Iron Company, Limited, to be permitted to take additional testimony.

Paragraph three (3) of said petition shows that the defendant went fully into all the facts to show that the defendant was not emitting injurious fumes; covered all the years 1911, 1912, 1913 and 1914, and attempted to show that this defendant had done no damage in those

years; and that on account of the construction of their acid plant, "that the percentage and amount of said fumes which it has not been able to prevent escaping is so small that no damage can result therefrom in the State of Georgia."

If they have not successfully proved the foregoing assertion it is their fault, if the statement be true. If the complainant has shown it not to be true, the defendant could not be taken by surprise, as it has, as it charges in its petition, attempted to prove the proposition.

The defendant admits in this paragraph that it introduced witnesses from different localities in the State of Georgia to prove there was no damage, in the last few years, "especially during the years 1911, 1912, 1913, and 1914, up to the taking of its depositions," the last of June.

Any further evidence then could only be cumulative. They had notice and knew the State would introduce evidence to show there was smoke injury in various localities mentioned in the petition and it introduced about one thousand pages of evidence to try and disprove this particular fact, and sent their witnesses to every locality referred to in its petition, with the possible exception of one, and its witnesses testified to the condition there and the same is now in evidence; besides many of the witnesses they now offer to introduce in rebuttal are the same witnesses who have already been on the stand and could and should have given what they knew when so introduced.

Testimony as to conditions in nearly all the localities mentioned in paragraph four (4) of defendant's petition has already been taken by this defendant and is now on file with the court.

If defendant did not visit any of these Sections before complainant took its evidence, it also is to blame, as it

ought to have anticipated any such evidence, and by due diligence could have met it in advance.

Any way, it is only a question of veracity between the witnesses. Defendant especially covered the Jack River, Epworth and Mineral Bluff sections in its evidence, and is now complaining. In fact they sent one of their "commissions" as far as Ellijay, Georgia, and they testified as to conditions in the Ellijay sections, and this and the Ellijay Valley section they now complain that they had no knowledge of in advance of the State's evidence.

These "commissions" or parties consisted of eight or ten men who went into the localities named, and as far south as Ellijay, and all or part of said witnesses have already testified for the defendant in this hearing and their evidence is before the Court.

The defendant had witnesses who testified they went specially through those sections to look at the conditions and testified as to what they were.

Defendant complains in paragraph four (4) that it could not anticipate the proof that complainant made as to conditions that prevailed from May 4th to May 16th, 1913, and from July 1st to 6th, 1914, during which time the Tennessee Copper Company was closed down and defendant company in operation.

No one could know so well as the defendant that these dates were important in this case. The truth is it sought to conceal the fact from the complainant that it was running at a time when the Tennessee Copper Company was closed down.

Paragraph five (5) of defendant's petition charges that complainant introduced evidence to show smoke injury to three or four counties of North Georgia. This is an erroneous statement. Complainant's evidence related to conditions in Fannin and Gilmer counties alone,

and the greater part to conditions in Fannin County, Georgia, immediately south of the defendant's plant.

As to defendant's charge "that it would have been very expensive for the defendant to have anticipated the complainant's evidence as to the different facilities." The defendant took two hundred (200) to two hundred fifty (250) more pages of evidence than the plaintiff and if most of said evidence is irrelevant it is the fault of this defendant alone.

The two experts referred to in this paragraph were Dr. W. T. Hedgcock and E. B. Clark, who are United States government officials and disinterested witnesses and most of their evidence was in rebuttal of expert evidence introduced by this defendant. These experts introduced by the complainant went out and observed the conditions that prevailed just as the defendant's experts did and the complainant's expert's evidence was directed mainly in rebuttal of defendant's expert's evidence as above shown.

Paragraph six (6) of defendant's petition shows the same thing as paragraph four (4) thereof, that the defendant company knew the dates therein referred to, that is, from May 4th to 16th, 1913, and July 1st to 6th, 1914, were dates that were of vital interest in this case as defendant's plant was in operation and Tennessee Copper Company was closed down.

While it is not charged in so many words, it is intimated all through the defendant's evidence that whatever injury is done on account of the Tennessee Copper Company's plant, is not chargeable to defendant; and the evidence on this point was directly in rebuttal of defendant's witnesses.

If that is true, it ought to have shown that while the Tennessee Copper Company was closed down there was

no sulphur smoke and this the defendants would have proved if it had not have avoided that question studiously. In the same paragraph defendant complains that such of the damage complained of to orchards in Georgia is from the San Jose Scale, and this they could not anticipate. Complainant denies all this. The facts are the defendant in its evidence attempted to prove that all the injury complained of in North Georgia was on account of insects and like causes, and not from smoke injury. The opening of the case for further evidence on this line could only be on matters already gone over, and as above shown, the defendant has taken much more evidence than the State of Georgia. The State agrees that most of the defendant's evidence is irrelevant, but defendant is chargeable therewith.

There is nothing whatever in the proposition that the taking of testimony should be reopened because of the defendant's having taken color photographs since the State closed its evidence. All the proof shows that there are trees and spots in badly affected regions that do not show smoke injury; and besides, the defendant has already filed a great number of color photographs of various points in the territory which were taken by the same witnesses they ask the court now to let them interrogate further.

Finally, the defendant should not be allowed to take further evidence for the reason that the State had no notice at the time of closing its evidence that any such request as this would be made. To grant their application would entail great and unnecessary expense on the State. The State had employed special counsel to take the original evidence in the case, and counsel's employment has terminated. For these reasons if the defendant had contemplated taking additional evidence it should

have so informed the plaintiff at the time. Weeks have elapsed since the evidence was closed. The record has been filed and is now ready for the printer. It would put the State, the complainant, at a great disadvantage to allow the defendant at this late day to re-open the case and put up a number of witnesses who have already been on the stand, many of them, and the State given no opportunity to rebut them; and if the State were given such an opportunity the defendant could in turn again ask permission to take evidence and this would be interminable.

Further, if the defendant cannot show the changed condition in North Georgia, under the order of this Honorable Court in one thousand (1,000) pages of evidence it could not do so if allowed to retake evidence and no doubt add another thousand (1,000) pages of evidence.

The State is content to rest with two hundred fifty (250) pages less evidence than that which the defendant has already taken.

There ought to be an end somewhere to the taking of evidence, and the court considered and determined this matter in its opinion handed down on April 13th, 1914, giving this defendant until July 1st thereafter to take and conclude its testimony; and the prayer of the defendant to be allowed to take additional evidence, at this late day, which evidence is in the main merely cumulative, ought not to be granted.

All of which is respectfully submitted:

THE STATE OF GEORGIA,

By Warren Grice,
Its Attorney-General.

STATE OF GEORGIA,
COUNTY OF FULTON.

Personally appeared before me, W. E. Talley, Deputy Clerk of the Supreme Court of said State, an officer authorized by law to administer oaths, J. A. Drake, who makes oath and says that he is the special counsel for the State of Georgia who has had specially in charge the procuring of testimony on behalf of the complainant in the case of the State of Georgia v. Ducktown Sulphur, Copper and Iron Company, Limited, No. 1, Original in the Supreme Court of the United States, and was present when all the evidence was taken on behalf of both complainant and the defendant and participated in the examination of witnesses, has familiarized himself with the contents of the application of the defendant company in its effort to be permitted by the court to take certain additional testimony and has assisted in the preparation of the foregoing objection to the granting of the prayer of the defendant and that the statements made in the foregoing objections are true.

J. A. DRAKE.

Sworn to and subscribed before me this the 6th day of October, 1914.

W. E. TALLEY,
Deputy Clerk Supreme Court of Georgia.

FILE COPY.

Office Supreme Court, U. S.
FILED
FEB 24 1915
JAMES D. MAHER
CLERK

IN THE

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1914.

No. 1, Original.

STATE OF GEORGIA, COMPLAINANT,

vs.

TENNESSEE COPPER COMPANY AND DUCKTOWN SULPHUR, COPPER AND IRON COMPANY, LIMITED, DEFENDANTS.

MOTION TO ASSIGN FOR HEARING.

To the Honorable the Supreme Court of the United States:

Comes now the complainant, the State of Georgia, and by leave of the court first had and obtained presents this its motion in the above-entitled cause and respectfully represents:

That heretofore, upon consideration of this cause, this court held that complainant was entitled to an injunctive decree, the entering of which was postponed; that subsequently complainant filed its motion to have entered said de-

cree as against the defendant the Ducktown Sulphur, Copper and Iron Company, Limited, and submitted to the court a form thereof; that in opposition to said motion of complainant the defendant last named moved the court to be allowed to submit testimony showing that since the decision was rendered the said company had removed the conditions which the court had held made proper the granting of the decree; that upon consideration of this motion last referred to this court declined at that time to enter the decree, and by an appropriate order permitted said defendant to take testimony on the issue whether said conditions had materially changed since the date it had been determined by this court that complainant was entitled to said decree, the court by its order likewise permitting complainant to take and submit rebuttal proof; that subsequently the court on the motion of said defendant allowed it to take additional proof, all of which has been done.

Complainant now moves the court to assign for argument and consideration its aforesaid motion to enter an injunctive decree against the Ducktown, Sulphur, Copper and Iron Company, Limited, defendant.

Due notice to counsel for defendants of complainant's purpose to present this motion has been given.

It is believed that if the court should assign this matter for Monday, April 5, next, this date would be agreeable to all counsel concerned.

Respectfully submitted,

THE STATE OF GEORGIA,
By WARREN GRICE,
Its Attorney General.

FILE COPY

MAR 27 1915

JAMES D. MAHER
CLERK

Supreme Court of the United States

October Term, 1914

No. 1.—Original.

THE STATE OF GEORGIA, COMPLAINANT,

BY ITS ATTORNEY-GENERAL,

vs.

THE TENNESSEE COPPER COMPANY AND THE DUCKTOWN SULPHUR, COPPER AND IRON COMPANY (Limited), DEFENDANTS.

IN EQUITY.

BRIEF AND ARGUMENT FOR COMPLAINANT UPON ITS MOTION TO ENTER INJUNCTION DECREE.

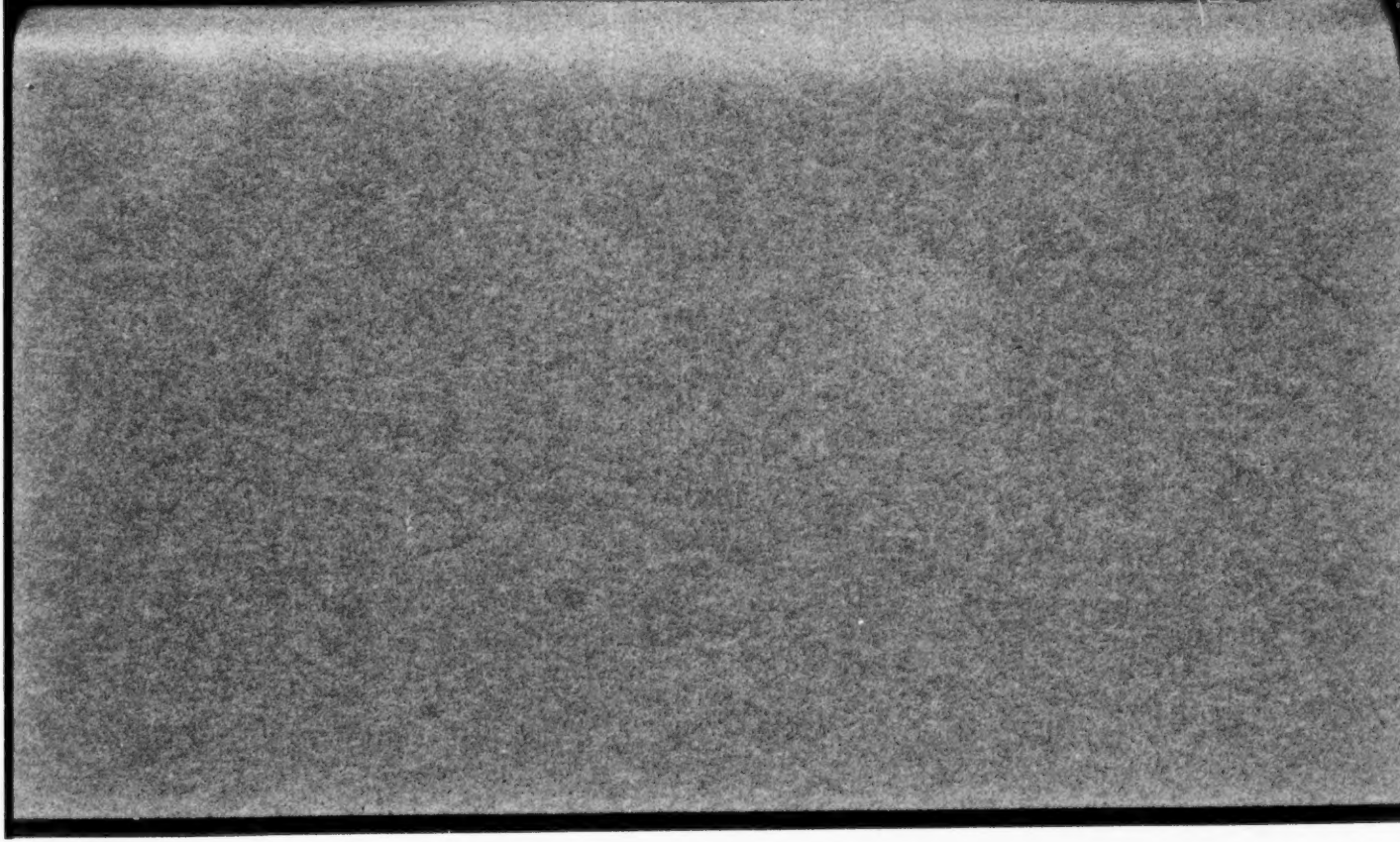
WARREN GRICE,
Solicitor for the State of Georgia.

J. A. DRAKE,
Special Counsel.

LAMAR HILL,
Of Counsel.

ATLANTA, GA.

CHAS. P. BYRD, STATE PRINTER.



AUTHORITIES CITED IN THIS BRIEF.

State of Georgia, etc. vs. Tennessee Copper Co., et al., 206 U. S. 230.

IN THE

Supreme Court of the United States

No. 1 ORIGINAL—OCTOBER TERM 1914

THE STATE OF GEORGIA, etc.,
Complainant
vs.
THE TENNESSEE COPPER COMPANY, and the DUCKTOWN SULPHUR, COPPER AND IRON COMPANY (Limited),
Defendants.

Motion of Complainant to enter injunction decree against the defendant, the Ducktown Sulphur, Copper and Iron Company (Limited).

STATEMENT OF FACTS.

This case was brought originally by the State of Georgia against the defendants seeking a permanent injunction from this court to restrain defendants from liberating into the atmosphere sulphur dioxide and other noxious fumes and gases claimed by the State to be injurious and deadly to plant life, from their smelters in Tennessee, located respectively one half mile and two and one half miles from the northern boundary line of the State of Georgia. Georgia vs. Copper Companies, 206 U. S., page 230.

It was claimed by the State that these fumes and gases being liberated into the air were brought by the winds into and over

the State of Georgia, polluting the atmosphere, injuring and killing the timber and forests of Georgia, injuring the soil and causing erosion thereof, causing the drying up of water courses and seriously injuring the agricultural and timber interests of that section of the State.

After the evidence of many hundreds of witnesses for both complainant and defendants had been filed with the court, a decision was had in May, 1907, in which the court held that the State of Georgia in her sovereign capacity had the right to a permanent injunction against the defendants if she insisted upon her extreme right. 206 U. S., page 230.

The State of Georgia pursuing her policy of "Wisdom, Justice and Moderation," did not at that time insist upon a final decree, but by resolution of her legislature allowed these defendants time in which to install certain appliances and apparatus which it was claimed by defendants, would eliminate the gases and fumes complained of from the atmosphere, thereby abating the nuisance.

From time to time thereafter the State has postponed its motion for final decree in the hope and expectation that the statements and claims of the defendants would be realized.

In 1913, by resolution of its legislature, it entered into a stipulation, now on file in this court as part of the record in this case, with the Tennessee Copper Company, granting said defendant a continuance of three years in which to further perfect its plant and apparatus for the elimination of the fumes, and whereby the Tennessee Copper Company agreed to curtail its operations, during the growing season for crops and farm products to such an extent that there would be no gases or

fumes eliminated from its plant, and in addition it agreed to deposit a certain sum of money each year to be awarded by a board of arbitration to all citizens of Georgia claiming any injury at its hands.

By this stipulation the State did not surrender or in any manner abridge its right to insist upon a final injunction against the Tennessee Copper Company, and in the event of a breach of the agreements therein contained it will ask this court for a final and permanent injunction. The main consideration for this stipulation was the abatement of the nuisance.

The State offered to enter into the same or a similar stipulation with the other defendant, the Ducktown Sulphur, Copper & Iron Company, Limited, but this defendant declined and refused to treat with the State or to enter into any stipulation or agreement whatever, whereby it would curtail its operations so as to eliminate the fumes during the growing season.

Upon complaint of its citizens during the year 1913, of continuing and serious damage and injury, the State by its Attorney General, filed with this court the motion now before it for a final decree of injunction against the defendant, the Ducktown Sulphur, Copper & Iron Company, Limited.

In response to this motion by the complainant, the said defendant filed with this court a petition setting out that conditions existing in Georgia were greatly improved since the granting of the original decree and that there was now no damage or injury from sulphur fumes being done within the State of Georgia, and praying leave to establish this fact by evidence.

The court granted the defendant the right to take proof and granted the complainant the right to also take proof in rebuttal

to that for the defendant. After both defendant and complainant had examined a large number of witnesses the defendant again asked leave of the court to submit further evidence in rebuttal to that of the State, after the time had expired originally allowed by the court for taking evidence. This prayer was granted and additional evidence for the defendant was taken, a large number of witnesses being examined.

The sole issue now before this court is whether or not the nuisance originally complained of and still complained of by the State has been abated, and we submit that the defendant, the Ducktown Sulphur, Copper & Iron Company has assumed the burden of proof in such issue.

BRIEF AND ARGUMENT.

By the order allowing the taking of evidence the parties were confined solely in such evidence, to the change existing in conditions since 1907. From the outset the court will observe from the record that a great part of the evidence of the defendant is therefore irrelevant as it attempts to and does go back to the origin of the copper industry in Tennessee and conditions then existing in Tennessee and Georgia, and does not bear in any way upon the issue now before the court.

It will also be observed that almost all of the evidence introduced by the defendant is negative in its nature and we submit is not sufficient to carry the burden of proof resting upon the defendant. Many witnesses testify that they have observed no damage in certain localities or at certain times and some testify that they have never observed any damage whatever in North Georgia due to the said fumes and gases.

It will also be observed that a large number of witnesses who testify in the present issue, by their own admissions, and by

reference to the original record in this case, testified in the original case that there was no damage existing in North Georgia and that none had been done by the defendants at that time, and this court found in that issue, as a matter of fact, that damage had been and was being done at that time sufficient to warrant the court in allowing the State an injunction against the defendants. 206 U. S., p. 238. In that decision the Court said: "The proof requires but a few words. It is not denied that the defendants generate in their works near the Georgia line large quantities of sulphur dioxide which becomes sulphurous acid by its mixture with the air, and that it is often carried by the winds great distances and over great tracts of Georgia land, etc."

The court will also observe that a great number of witnesses are employees of the defendants or one of them, or have been at some time, and have testified time and time again for the defendants not only in this cause but in almost every action at law or in equity brought against the defendants and have consistently sworn that there was not and never had been damage to the State, its timber, forests or agricultural interests due to or caused by the fumes from the plants of the defendants.

A large number of the defendant's witnesses testify that there is no damage or injury existing in North Georgia. A large number of witnesses for the defendant admit that there is damage existing but it is the contention of the defendant Company that this damage is caused by and due to the operations of the other defendant, the Tennessee Copper Company.

The defendants in this case are the only source of information for this court as to the relative operations of the two companies, their consumption of ore, their output of copper, their output of sulphuric acid which is manufactured, it is claimed, by defendants, from the sulphur dioxide liberated from the ores. These defendants have failed utterly to show to the court by one

scintilla of evidence, these facts, and the court is left absolutely in the dark by them as to what each company is doing.

It is claimed by the defendant that they have spent large sums of money for the erection of acid plants or "acid chambers" for the condensation of sulphur dioxide into sulphuric acid and that they are now condensing all of the sulphur dioxide liberated from the ores smelted by them, and by this method eliminating from the atmosphere the fumes and gases complained of. They call especially to the attention of the court the enormous sums claimed to have been expended and rely upon this as evidence of alleged good faith in their efforts to eliminate the fumes. It is submitted by the complainant that even if these contentions of the defendant are true, it is at this time operating upon a much larger scale than in 1906, smelting a much larger amount of green ore and thereby creating a much larger amount of sulphur dioxide, and that the relative amount of sulphur dioxide emitted in 1906 was less than that emitted in 1913 and 1914. The complainant charged this through all of its evidence, and even in the taking of rebuttal proof by the defendant not one word nor one figure was introduced to controvert this charge.

It is also submitted that not one word of evidence was introduced showing that the acid plants or "chambers" were condensing all of the fumes created in the furnaces of the company.

It is further submitted that the question of good faith is not at issue, and even though the defendant had spent ten times the amount claimed by it to have been expended in the development and erection of its plants and acid chambers, yet this court would not consider that fact in the determination of this issue, and it would be entitled to no consideration, for if there is injury and damage being done in North Georgia the complainant is entitled to its final decree and injunction regardless of the good faith of the defendant.

It may be claimed by the defendant that the value of property in North Georgia alleged to be injured by gases from its plant is relatively small as compared to the value of the interests of the defendant. The complainant submits that this issue is not one involving the question of values, even though it were conceded that the contention of the defendant was correct, which however is not conceded,—but the State comes before this court as a sovereign, with all the rights of a sovereign to and over the lands within its domains and complains of injury and damage to its lands, timber and forests, and not the lands timber and forests of any individual. It is not the individuals, primarily, for whom the state is seeking protection but itself and its interests and its sovereign ownership of the property injured.

This Court said in its original decision in this case "Some peculiarities necessarily mark a suit of this kind. If the State has a case at all, it is somewhat more certainly entitled to specific relief than a private party might be. It is not lightly to be required to give up quasi sovereign rights for pay; and, apart from the difficulty of valuing such rights in money, if that be its choice it may insist that an infraction of them shall be stopped. The states, by entering the union, did not sink to the position of private owners, subject to one system of private law. This Court has not quite the same freedom to balance the harm that will be done by an injunction against that of which the plaintiff complains, that it would have in deciding between two subjects of a single political power. Without excluding the considerations that equity always takes into account, we cannot give the weight that was given them in argument to a comparison between the damage threatened to the plaintiff and the calamity of a possible stop to the defendant's business, the question of health, the character of the forests as a first or second growth, the commercial possibility or impossibility of reducing the fumes to sulphuric acid, the special adaptation of the business to the place. It is a fair and reasonable demand on the part of a sovereign that the air over its territory should not be polluted on a great scale by sulphurous acid gas, that

the forests on its mountains, be they better or worse, and whatever domestic destruction they have suffered, should not be further destroyed or threatened by the act of persons beyond its control, that the crops and orchards on its hills should not be endangered from the same source. . . ." State of Georgia vs. Tennessee Copper Company, et al, 206 U. S. 237.

Further therein, the court says "If the State of Georgia adheres to its determination, there is no alternative to issuing an injunction, after allowing a reasonable time to the defendants to complete the structures that they now are building, and the efforts that they are making to stop the fumes." Id. p. 239.

In all cases of the nature of the one at bar the best evidence which can be submitted to the court is not the evidence of experts who testify from observation of conditions for a short time or at certain intervals, nor is it photographs showing sections of the country at long range, where the camera might include in its focus a portion of the landscape where no damage exists, when a short distance away there might be sections entirely devastated,—and it is shown by the evidence that the injury is not uniform,—nor is it in opinions based upon hypothetical questions propounded by counsel, nor in the evidence of "committees" or "parties" going through the country observing conditions which they find close at hand; but the best evidence is that of the citizens of the affected country who live their daily lives amid the existing conditions, who toil and labor for their daily bread upon the soil which supports them, whose livelihood depends upon the success or failure of their crops, whose entire store of worldly goods consists of the few acres of timber and crops which they own and cultivate, and who for years have observed the effect of the fumes and gases from the defendant's plant upon their growing things and know the danger incident thereto, and who have watched their crops and garden products grow and thrive only to be blighted and withered by the devastating agent which comes like death and reaps its harvest of

lives of plants and trees. It is they who know more than any others on earth of things as they exist and who tell the court in their simple way of the destruction wrought by the product of the defendant's plant.

We have brought before the court witnesses of this class, farmers who have spent their entire lives in the affected region of North Georgia, timber men who have lived in the forests and made the study of practical forestry their life work, who have seen the smoke carrying the fumes from the stacks of the defendant directly over and into the forests, who have noticed the conditions existing immediately before and after this visitation and who tell the court of the sudden blighting, withering and death of the trees after the smoke has been upon them.

The only purpose which the expert testimony can serve is to show that sulphur dioxide is injurious and even deadly to plant life, but this fact has already been established by this court in this case. It is shown by the experts for the complainant and defendant both in the original case and in the original issue and is undenied and uncontroverted that 1 part of sulphur dioxide to 10,000 parts of air is deadly, that one part of sulphur dioxide to 100,000 parts of air is seriously injurious and that even 1 part to 1,000,000 parts is injurious if the contact with the plant continues for sufficient length of time. (Evidence, p. 838.) It is also shown by these experts how the injury occurs and why. The physiology of plants and trees is gone into and the functions of the different organs explained and the effect on them of the fumes.

But for the real cause of the injury, the visitation of the smoke and fumes and the damage immediately resulting, the only evidence worthy of consideration is that of the farmers and timber men themselves, who see the smoke descend and immediately thereafter see the injury to plant life.

In the investigation of all actions at law or in equity one of

the primary elements in the consideration of evidence is the interest or lack of interest of the witnesses. It will be observed that almost every witness introduced by the defendant was employed by it for the purpose of making a tour of investigation to show that no damage existed. And it is only human that witnesses of this nature should consciously or unconsciously endeavor to find that which their employer desires found, that is in this case, that there is no damage in North Georgia.

It might be said by the defendant that the witnesses for the state are also interested in that they are the landowners whose property it is claimed, is affected and damaged. Conceding this for the sake of argument, the attention of the court is directed to three witnesses, who do not live in North Georgia, who have no property interests there but who testify as a matter of duty and under the direction of the Federal Government. They are Dr. W. T. Hedgecock, H. L. Johnson and E. B. Clark, three employees of the Bureau of Forestry of the United States.

Dr. Hedgecock testifies (Complainant's evidence, p. 2) that he is the plant pathologist of the bureau, that he has devoted his entire life to this study, that under the direction of the Bureau he has devoted the last several years to the study of the effect of sulphur dioxide from copper plants on plant life, and that in the course of his investigations he has visited almost every plant of like nature to those of the defendants, in the United States.

He testifies as to the effect of sulphur dioxide, the manner of its effect, the method by which the functions of certain organs of the tree are stopped and death brought about, and to the geographical extent of the injury. He shows that there are three zones of injury existing around all copper plants of this nature and particularly about the plant of the defendant. The first or barren zone, the second or zone of acute injury, the third or zone of chronic injury, the fourth or zone of invis-

ible injury; the zone of acute injury extending for a distance of six to ten miles from the smelter. (Evidence, p. 5.) He testifies that on one trip he had personally observed severe damage resulting from the plant of the defendant in Georgia as far south as 10 miles from the plant. (Evidence, p. 8.) He testifies positively and unequivocally, that there is smelter injury existing in North Georgia today and that every fact points to this condition and that the injury observed by him was to a large extent fresh and was injury of the present or the immediately preceding years. (Complainant's evidence, pp. 4 and 5.) He testified also that the fumes from the present defendant company's plant were causing injury to the affected sections. That said plant was located in the geographical center of the zones of injury (Evidence, p. 7) and that he had personally observed and seen the smoke rising from the plant of this defendant and being brought by the winds and air currents directly into the State of Georgia. That he had seen the smoke from the stack of the Tennessee Copper Company also rise into the air and that this smoke rose to a much greater height than that from the Ducktown Company's plant and was carried farther away than the latter. He testified that the injury for the first 6 to 15 miles in Georgia, was being done by the present defendant the Ducktown Sulphur, Copper & Iron Company (Evidence, pp. 7, 16, 17). This opinion was based upon actual observation and investigation by the witness.

Dr. Hedgecock made several trips of investigation through the northern counties of Georgia and made close and minute observations of the forests and the injury to them. He introduced samples showing the injury, which samples were obtained by him on these trips. He established beyond question that there is injury being done and that it is being done in large part at least, by the present defendant. He has watched and seen the smoke, the vehicle for the fumes, come from the defendant's plant directly over and into the mountains of North Georgia and has seen it settle among the trees and plants and forests. (Evidence, pp. 16 and 17.) He also testifies that the injury is not uniform in the country and the action of the smoke is not uni-

form; that its travels are greatly affected by the prevailing air currents and that the atmospheric conditions regulate the rapidity of diffusion of the gases and thereby the injury caused by them. (Evidence, pp. 8 and 17.) He testifies that all of the north Georgia section visited by him was greatly injured and that such injury was caused by sulphur dioxide. (Evidence, pp. 6, 8, 9, 16, 20.)

Messrs. Johnson and Clark corroborate Dr. Hedgecock in all of his evidence, and these three witnesses are entirely disinterested and did not and could not receive one penny for their services. The State desired to get disinterested witnesses for use in this case and through its governor applied to the Federal Government for experts to make the investigations and to give evidence. The state has not even introduced its own officials but has relied solely upon the testimony of the government experts.

The burden being upon this defendant, as before stated, there are two methods and only two, by which they could have successfully carried that burden,—the first by showing that no smelter injury exists in North Georgia; the second, by showing that if such injury does exist that it is attributable not to the operation of their plant but to that of the Tennessee Copper Company.

The existence or non-existence of smelter injury, we submit, is so notorious in the alleged affected section of the state that it would be a matter of no difficulty to establish it. But not only has the defendant failed to establish its non-existence, but on the contrary many of its own witnesses swear that there is smelter injury. True, some of its witnesses, in their eagerness to serve their employer, have gone beyond the contention of the defendant, and have testified to the negative proposition that they have seen no damage whatever, but their testimony is of no value as against that of the numbers of witnesses on be-

half of the state who swear that they have seen and smelled the smoke which carries the fumes and have seen with their own eyes its effect upon the growing things. We say that these witnesses have gone beyond the contention of the defendant, for the defendant has, by the class of evidence introduced abandoned its stand, if it ever took any, on the first proposition, and has relied solely upon the second proposition stated above, that is that the damage, which they virtually concede exists, is being done, not by them but by the Tennessee Copper Company.

Having thus virtually abandoned the first proposition, the defendant comes into court on the sole remaining issue that the Tennessee Copper Company is the cause of the injury instead of itself—and this is the only question for this court to determine.

They do not come before the court in an open, frank manner and make this charge, but by inuendo, insinuation and suggestion, would have the court believe that this is the fact.

They do not bring the best evidence to establish this fact, and particularly do they fail to introduce the one man whose evidence would be authoritative on this subject, their superintendent, general manager and expert chemist and mining engineer, Mr. Renwick, but rely upon the evidence of Lamoreaux, an employe of a rank subordinate to Renwick, unsupported by the books, which they have utterly failed to produce, and upon the testimony of McCandless and Gilchrist, the latter carrying his testimony to the point of absurdity by swearing that no more sulphur dioxide from the plants of the two defendants was present in the air in North Georgia than existed daily in such cities as Chicago and Cleveland, and with no more injurious effect. (Evidence, p. 834.)

Why was it that the defendant failed to produce this all-im-

portant witness? Why not give the court the benefit of the testimony of this man who is in charge of the entire operations of the company? We submit that it was for the reason that Renwick, being an engineer of the highest standing, a man, who so far as we know, is above reproach, could not jeopardize his position as an engineer and chemist by stretching or altering facts in the slightest degree, and that the Company knew that such testimony as he would give would not support their contentions, and it is a well known engineering fact that it is an utter impossibility, under known methods, to eliminate as much as fifty per cent of the sulphur dioxide from the fumes emitted from the plants of copper smelters.

Instead of bringing Renwick, they introduce his assistant, Mr. Lamoreaux, who testified from a memorandum sheet evidently furnished him by the bookkeeper or some other person not under oath (Evidence, p. 805), as to the output of the company, the object being to show by the figures, that all of the sulphur present in the ore was accounted for by the amount of sulphuric acid shipped from the plant together with the sulphur left in the "flue dust," except an amount escaping into the air, so negligible that it had no injurious effect upon plant life.

The State, through all of the testimony of Lamoreaux, objected to his evidence as not being the best, and insisted upon the production of the books of the Company as being the highest and best evidence obtainable, and questioned the accuracy of the figures given by Lamoreaux and insisted that they were incorrect and did not show anything on which the court could legally or morally rely. (Evidence, p. 805.) The State still insists upon its objections and submits that all of this evidence is inadmissible for the reasons given in the record, and that therefore there is not one scintilla of evidence in the entire case as to the consumption of ore, the percentage of sulphur therein and the amount of sulphuric acid produced by the plant to sustain the contention of the defendant that all of the sulphur is

accounted for, but on the other hand the court, we submit, is authorized under the evidence to find that all of the sulphur contained in the ore is emitted into the atmosphere in the form of sulphur dioxide.

Not only did the defendant fail to produce the best evidence, but failed to produce the best secondary evidence, if such would be admissible, to-wit: Mr. Barron, their bookkeeper, as shown by the testimony of Lamoreaux (Evidence, p. 819). Barron could have been put under oath and could have testified that the facts contained in the memorandum used by Lamoreaux were correct. But they did not even do this. No did they produce any other man, than Lamoreaux, connected with the operation of the plant. The State showed on cross-examination of Lamoreaux the names and titles of the officials connected with the operation of the plant (Evidence, p. 819) but not one of these men was put on the stand to show any of the facts about which they could testify with more certainty than any one else, and the court is left in complete darkness as to the true situation as regards consumption of ore and output of acid, except such light as is thrown on the matter by the evidence of Lamoreaux which we submit is inadmissable.

The man who could, above all others, speak with certainty of the operation of the acid plant is Mr. Larison, the superintendent of the acid plant, and he is not called as a witness. In fact the record shows that they have not given the court the benefit of the expert knowledge of a single employee in authority, except Lamoreaux.

This man could have spoken in detail on the size of the acid chambers, the output of acid, the capacity, the successful or unsuccessful operation of this plant from day to day, and this is the most vital point at issue in this case. The question naturally arises, why did they not introduce this all-important witness?

Another man, who, next to the superintendent of the acid

plant, was important, if they desired to disclose the truth as to the operation of the plant, was Mr. Nolde, the smelter superintendent, who could have told all about the method of smelting the ore and the method of feeding the fumes from the smelters to the acid chambers, the uniform sulphur contents of the ore, the method of making the fumes into sulphuric acid, and in fact he could have spoken from personal knowledge on all these vital questions, as to which the court is left in the dark. Why is this evidence kept from the court, if it is not for the purpose of keeping the light off the very subject on which the court desires enlightenment?

These witnesses were all in the jurisdiction of the court and were in and under the control of the defendant and could have been easily produced.

We submit that these are strong circumstances against the bona fides of their efforts to give the court all the knowledge on the subject at their command.

Another significant fact in this connection is that the defendant carried its witnesses a distance of from one hundred to one hundred and fifty miles from the scene of operation and injury, to Chattanooga and Knoxville, Tennessee, when as admitted by the defendant (Evidence, p. 1199) there was a competent commissioner and a court house within two miles of their plant before whom and in which this evidence could have been taken. It was not their desire to have the examination conducted where the evidence of smelter injury could be pointed out to the witnesses as they were on the stand and their attention called to it, and this fact made a part of the record.

On the other hand the State conducted its examination in the section alleged to be affected and it was a favorite method of cross examination with the defendant's counsel to ask the witnesses if they could point out any smelter injury from the win-

dows of the court room, in which the hearings were, at Blue Ridge, Georgia. (Evidence, pp. 91 and 92.) If the evidence of the defendant had been taken at Ducktown, Tennessee, the nearest court house to their witnesses and their plant, the State, by pursuing the same tactics on cross examination could have shown by every witness put up by the defendant, and had it made a part of the record, that the hills around Ducktown are as barren and desolate of plant life as the Sahara desert.

Under the testimony of Lamoreaux, McCandless and Gilchrist the defendant claims that it curtails its operations and output during the growing season, and fixes this growing season for the months of June, July and August of each year (Evidence, pp. 817, 820), when under all of the evidence, including the stipulation between the State and the other defendant, the Tennessee Copper Company, of file in this case, the growing season extends from the 10th of April to the 1st of October, each year, and the State contends, that under these facts, and taking into consideration the additional fact that the Ducktown Company curtails operations for only three months of each year and the Tennessee Company for five and one-half months each year, the Ducktown Company operates on as large a scale and emits more sulphur dioxide from its plant than its larger neighbor, the Tennessee Company, during the growing season from April 10th to October 1st each year.

While the Tennessee Copper Company has seven furnaces, it operates only two of them during the growing season as fixed in its stipulation with the State, while the Ducktown Company operates at full capacity except for three months according to its own admissions. (Evidence, pp. 817 and 820.)

While the Tennessee Company operates two furnaces during the five and one half months mentioned, and the Ducktown Company operates possibly only one during the three months of June, July and August, it is conceded by Mr. Lamoreaux (Evi-

dence, p. 803) that the acid chambers of the Tennessee Copper Company have a daily capacity of 1,200 tons, while the capacity of the Ducktown Company's acid chambers according to their own figures as given in Lamoreaux's exhibit No. 1, cannot be more than one hundred and thirty-five tons per day, if that much, the exact daily capacity having been studiously avoided by every witness for the defendant having any knowledge of the subject. The method by which we arrive at this conclusion is by figuring from the yearly output of acid as given by Lamoreaux in his exhibit No. 1.

Instead of bringing the officials of the company who would have knowledge of the matters about which they testified, the defendant has relied upon Lamoreaux and Sherman Reese. We have already called the attention of the court to the testimony of the former.

The defendant attempts by Sherman Reese to show to the Court the comparative size of the two plants of the defendant and the Tennessee Copper Company and the relative operations of same. Reese is an employee who testifies that he has been in the employ of the company for a long number of years and whose duties are to prepare evidence for use in the trial of cases against the Company. He is not connected in any manner with the operations of the plant, knows nothing of it and nothing of the operations of the Tennessee Copper Company as testified to by him on cross examination (Evidence, p. 627) and yet the company relies upon his evidence and keeps back men who could give the court definite information as to what the company was doing. Reese is simply an ordinary countryman whose duties have consisted of leading self-styled "commission" and "parties" through the country entertaining them at the expense of the defendant and showing them that there was no damage in North Georgia to his and their entire satisfaction. His knowledge is limited to that of a guide and his sole duties seemed to consist of issuing "commissions" to those witnesses who styled themselves members of "commissions" visiting the affected dis-

trict, since 1901, since nowhere is it shown that there was ever any authority creating the commission other than this ever ready witness, Reese. (Evidence, pp. 638-646.)

We submit that the defendant has utterly failed to carry the burden of proof resting upon it, and that the State was under no obligation or necessity of introducing any evidence in rebuttal of that for the defendant, but out of abundant caution, and desiring the court to have all the facts obtainable at hand, and to have the benefit of all the knowledge of the citizens of that section and their personal experiences and observations, the State produced a number of witnesses who had lived in that affected territory and who tell the Court of the daily, weekly, monthly and yearly havoc being wrought by these fumes upon their crops and timber. The State has not confined itself to any section of the affected country in getting witnesses but has brought them from every district claimed to be injured by the fumes from these plants, and their evidence has not been successfully rebutted. Not only have we shown by them that damage does exist but we have shown conclusively that such damage is attributable directly to the Ducktown Company by the evidence of the witnesses who testify that on certain days when it is shown the plant of the Tennessee Company was closed down, that the injurious gases were present in Georgia injuring and damaging plant life. The names of these witnesses and the pages on which their evidence appears are given below.

The only evidence produced by the defendant on this point is that of several witnesses who swear to the negative proposition that they have seen no damage, and most of these were in the employ of the Company and have been in its employ for a long time and have testified in various cases and at various times for it and who testified in 1906 that no damage existed when as before stated this Court found that damage did exist.

The witnesses for the state who testify as to the positive fact

of present damage, show that not only does this damage exist, but go to the very root of the matter here at issue and show that the damage in 1913 was as bad as any year previous to the decision of this court in this case in 1907, and that in 1914 conditions were worse than ever before in the history of the smoke trouble in Georgia. (James F. Teems, page 70; J. H. Clonts, evidence, page 82-85; C. S. Northcut, page 94; J. G. Adams, 365-66; Ashbury Henson, pages 99 and 100; W. H. Carver, 462; W. A. Painter, 107; John Miller, 190-191-2-3; W. S. Henson, 112; C. J. Trammel, 294-5; Geo. Henson, 119; W. H. Shippen, 325-339; F. E. Shippen, 394-5-6-7, 399; Geo. Rodgers, 124-125, 126, 127; J. P. Vestel, 171; J. M. Carter, 208; T. S. Johnson, 186-187; D. M. Buckhannan, 205; W. M. Bailey, 219; W. M. Barnes, 257-8; L. C. Allen, 230-231; B. H. Sebolt, 270-71; J. J. Turner, 249; A. J. Bell, 278.)

Rebutting the idea that the Tennessee Copper Company is doing all the damage in the State of Georgia the following witnesses show that during the month of May, 1913, on days named, while the Tennessee Copper Company's plant was closed down, that the smoke carrying the fumes of sulphur was seen, smelled and its effects noted in Georgia, to-wit: (J. P. Vestel, p. 170; T. R. Harkins, p. 242; W. M. Barnes, p. 263-4; A. J. Bell, p. 279; B. F. Weeks, pp. 351-354; J. H. Setzer, p. 456.)

It was shown by G. M. Panhorst, an employee of the Tennessee Copper Company, that this Company's plant was closed down on the days fixed by the witnesses, as the time when the damage above referred to was noted. (Evidence, Vol. I, p. 224.)

It was shown by this witness that the Tennessee Copper Company was closed down and smelting no ore whatever from the 23d day of June to the evening of the 6th day of July, 1914, during which time the following witnesses testify on behalf of the state that they saw, smelled and noted the injurious affect of

the fumes in Georgia, to-wit: R. H. Smith, pp. 196-201; J. P. Vestel, p. 168; D. M. Buckhannan, p. 205; L. C. Allen, p. 231; J. J. Turner, pp. 248-249; B. H. Sebolt, p. 267; W. T. Angel, pp. 272-275; W. H. Martin, p. 286; C. J. Trammel, p. 295; F. E. Shippen, p. 396; J. H. Setzer, p. 455; W. H. Carver, p. 461.

It was shown by these witnesses that at this time the Ducktown Copper Company was in operation and emitting the fume laden smoke, the cause of the damage above referred to, and that the smoke was seen coming from the plant of the Ducktown Copper Company during this time. (Evidence, pp. 248-9, 170-168, 205, 224, 201, 196, 231, 242, 263, 279, 286, 295, 272, 268.)

In introducing this evidence, the state has not gone into one certain locality and produced members of camping parties and self-styled commissions who testify, but has brought before the court the farmers and timber men living in the localities alleged to be affected, who tell of damage and injury from the smelter fumes in every section of north Georgia contiguous to the plants of the defendant.

It is not contended by the State that every foot or every acre of ground in these sections is affected or damaged, for it is an established fact under the evidence that the fume-laden smoke will come to earth blighting the growth at one spot and then rise again into the air to descend some distance off, and that one or several acres or more here, there and yonder will be damaged while the intervening territory will not be touched. The defendant's expert, Prof. Bain, testifies to this fact. (Evidence, pp. 945-946.)

But the main fact is established that generally speaking the entire section of North Georgia is damaged and so materially

damaged that it is impossible for the citizens of the state to earn their livelihood at farming, that they can no longer raise oats, or small grain, that the peas and potatoes are seriously affected each year and that the timber is being damaged all to the detriment of the sovereign rights of the State of Georgia. Many witnesses testify to these facts as follows: Geo. Henson, pp. 119-121; Geo. Rodgers, p. 124; A. E. Sharp, p. 143; W. S. Henson, pp. 115-116.

The state began its evidence by taking up the section immediately south of these plants and adjacent to the north boundary line of the state and extending from the state line a distance of ten to twelve miles south and south west of the plant of the defendant. This section embraced the points known on the maps introduced as Epworth, Minola, Higdon's Store, Fighting Town Creek, Grannymar Mountain and adjacent points. This section is about ten to twelve miles square. This is the section visited by the government experts, Dr. Geo. W. Hedgecock and E. B. Clark, and H. L. Johnson, government foresters, and Messrs. Vestal, citizens of Georgia on the 9th and 10th days of August, 1914. (Evidence, pp. 6-305.)

It is proved by the State that smelter injury is notoriously visible in all this section. (Evidence, Vol. I, p. . Dr. Hedgecock, pp. 9-13, E. B. Clark, pp. 303-4-5-315; H. L. Johnson, pp. 56-57, 60; J. P. Vestal, pp. 170-71; J. H. Vestal, T. R. Harkins, pp. 236-237-8-9; W. M. Barnes, pp. 258-9; G. F. Weeks, pp. 257-8; J. G. Adams, pp. 359-360, 361-2-3, etc.; F. E. Shippen, pp. 402-304.)

The State next went to the Mineral Bluff, Flat Creek and Morgantown sections of Fannin County, Georgia, all of which points lie southeast of the plant of the defendant and embrace a section of country about eight by twelve to fifteen miles in area. It is shown that in these sections smoke has been present in the years 1913 and 1914 and is visible and so strong that it

can be smelled. These facts are not only shown by the State's witnesses but are admitted by witnesses introduced by the defendant, who live in the Mineral Bluff section. (Evidence, Vol. II, p. 278; A. J. Bell, p. 278.)

These facts are shown by the following witnesses for the State. (Evidence, Vol. I, L. C. Allen, pp. 230-231; J. J. Turner, p. 247.)

The State next went to the section of country east of Ellijay, Gilmer County, Georgia, known as the Turniptown section. This point is about twenty to twenty-four miles almost due South from the plant of defendant. It is shown that in the year 1914 enormous damage has been done to large commercial apple orchards on the Turniptown Mountain, facing this plant, also to the wheat crops in that community and to the small orchards and farms, to the forests and to plant life generally, one witness, F. E. Shippen, giving the dates on which the smoke from the smelter of the defendant visited the section. (Evidence, Vol. 1, pp. 394 to 400.) Other witnesses testify to the same effect. Clonts stating that the smoke was so bad on one day that it seemed as though the woods were afire. That he could smell the smoke and that it was sulphur smoke, and that it was the smoke emitted from the defendant's plant as he had been to the plant and had there seen and smelled the smoke which was identical with that seen in the woods on the day mentioned. (Evidence, Vol. I, pp. 80 and 90.) That immediately after this smoke lifted the effects were visible on growing vegetation, and especially upon the apple orchards in that community and as a result of such injury the most of the young apples, which he stated were as large as the end of his thumb, fell off. (Evidence, Vol. I, p. 82.) In addition to the witnesses named above, these facts are shown by the following witnesses. (Evidence, Vol. I, C. S. Northcut, 94, 99-100; F. E. Shippen, 393 to 395, 398-99; Asbury Henson, 99-100, 101; W. A. Painter, 107-109; W. S. Henson, 111-112-113; Geo. Henson, 118-119, 121; Geo. Rodgers, 124-125, 127; A. E. Sharp, 140-141.)

The State then introduced witness from the section south southwest of Blue Ridge, known as Board Town Creek mountain. It is shown by these witnesses that they stood on this mountain on July 3rd, 1914, at which time the Tennessee Copper Company's plant was closed down (Evidence, Vol. 1, p. 219) and saw the smoke issuing from the Ducktown plant and coming into the state of Georgia and into that immediate neighborhood where they could see it in the coves and smell it. They saw the injurious effects on timber and crops immediately thereafter and testify that it was smelter injury. (Evidence, Vol. I, C. J. Trammell, 295; B. H. Sebolt, 267; D. M. Buckhannan, 205.)

The next witnesses for the State are brought from the section eight miles northwest of Ellijay, in Gilmer County, which is about fifteen to eighteen miles south of the defendant's plant. Their evidence shows that on various occasions in the years 1910, 1911, 1912 and especially in the years 1913 and 1914 these sulphurous fumes have come into this neighborhood and killed and injured timber and growing vegetation and that the conditions in 1914 were worse than in any previous year. (Evidence, Vol. I, J. W. Withrow, 127, 128, 129; A. E. Sharp, 135, 136, 139, 140.)

From this section comes A. E. Sharp who testifies as follows: That he stood on the tops of the various mountains (naming them, p. 149) in North Georgia, and watched the smoke issuing from these two plants and has observed its course and on various occasions has seen it come into the State of Georgia and settle in the coves. (F. E. Shippen, 150, 398.) That the two volumes of smoke can be distinguished. (Evidence, Vol. I, pp. 136 and 137.) This witness shows that as a woodsman he has been over practically all of Fannin and Gilmer and a part of Union County in the smoke affected section of North Georgia; that over the whole or practically the whole of this section there is serious smelter injury. (Evidence, Vol. I, pp. 139, 140, 153, 154, 155, 156.) He shows that much of this injury was recent and

some as late as within a week of the time he gave his evidence. (Evidence, Vol. I, p. 140.) He also shows the visible appearance and effect of smelter injury. (Evidence, Vol. I, pp. 140, 142, 143.) See also the evidence of F. E. Shippen, 395, 399; J. H. Clonts, 80, 182; Asbury Henson, 100, 101, 102, 103; Will H. Shippen, 320, 323; Dr. Geo. W. Hedgecock, pp. 18, 13, 16 and 17; E. B. Clark (government expert), 429, 304; J. P. Vestel, 164; H. L. Johnson (government forester), 60.

It is shown by the State that all or practically all of the hemlock timber in this section of North Georgia has been killed and that this section is the natural home of the hemlock. (Evidence, p. 20, Dr. G. W. Hedgecock, W. H. Shippen, p. 328.)

It is shown that North Georgia is especially adapted to the growth of Irish potatoes, oats, wheat and rye and the evidence shows that in practically all the neighborhoods and sections above referred to they no longer pretend or try to raise oats or cowpeas and such wheat as is sown is generally seriously damaged if not entirely killed and destroyed. One witness who runs a threshing machine, testified that whereas he used to thresh a great many oats, now he finds no oats to thresh in that section. (Defendant's Evidence, p. 671.) That cowpeas, which were once a material part of the crop, are now being seldom planted by the farmers because they have been so often killed in past years. (Geo. Henson evidence, pp. 119, 121; Geo. Rodgers, p. 124; A. E. Sharp, p. 143; Dr. Geo. W. Hedgecock, p. 13; W. S. Henson, pp. 115, 116.)

A. E. Sharp testifies he has not tried to raise peas in seven or eight years as the smelter smoke kills them "so bad." (Evidence, p. 143.)

We call the court's attention specially to the evidence of J. G. Adams (Evidence, p. 358). His evidence shows that he went

into the neighborhood of Minola, Higdon's Store, and Barnes Mountain section of Fannin county, Georgia, about six to ten miles almost due south from the defendant's plant and at various points took photographs of the forests, which photographs are made exhibits to his deposition numbered from 1 to 26 inclusive. Numbers 20 and 21 of said exhibits show the Ducktown Company's plant. The other exhibits, while they do not show the full extent of the injury as exists in North Georgia, do show unmistakable evidence of great injury to the forests in that section. Photographs do not and can not show the burned and parched leaves in a manner true to nature and as they really are. This fact is shown by the evidence of this photographer and by the other witnesses who were with him when they were made. (Evidence, pp. 362, 363, etc.) It is impossible for any photograph to show the situation as it is, the burning and parching, and the destruction and havoc wrought being far greater than it is possible for any invention of science to depict. This photographer shows that he is an expert in this line of work, having photographed forests and landscape views to be used in geographical work. He also shows and testifies that it is an impossibility to take a color photograph absolutely true to nature, and this statement is corroborated by the photographs introduced by the defendant in this case, where in many instances the colors of objects shown in the picture are not the true natural colors, which fact is noticeable to any observer of the photograph. For instance fence rails and roofs of houses, roads and banks do not have their natural color but appear blue or discolored, sedge grass, weeds, leaves and small vegetation cannot be distinguished by their colors, as will be seen from the various color photographs introduced.

But the main argument against photographs as evidence is that, as stated in the beginning, the camera might include in one picture a portion of territory not affected by fumes, when a few yards away might lie a territory of entire devastation.

The photographs introduced by the defendant in this case

were all taken by a man who had been in the employ of the defendant on a number of occasions and under the direction and supervision of Sherman Reese, for many years an employee of the defendant and the man in charge of the work of preparing evidence for the company for use in cases of this sort.

It is strange that in the number of photographs introduced by the defendant there is not one which shows their plant in operation, the smoke issuing from the stack and the entirely devastated sction surrounding it where the hills are barren of all vegetation and there is no growing thing, except possibly a stubby growth of sedge grass, the hardiest of all the plants and the most resistant to smelter injury. If there were no smoke emitted from its stacks, and if there were no devastation immediately around the furnaces, the company would surely have shown these facts to the court by photographs as they have attempted to show by so many that there was no damage in Georgia.

These photographs are part of the numerous scientific exhibits introduced in the effort to overcome the testimony of so many living witnesses for the complainant, who daily see the injury and damage existing around them. Among the other exhibits of this nature were certain cores or "borings" taken from trees by Prof. Bain and his assistant. The defendant refers throughout its evidence to about sixty of these cores (Evidence, p. 926), but only two were introduced in evidence and an enlargement by photograph of one of these. (Evidence, pp. 845, 846.)

The purpose of these cores was to show the annual ring growths of the trees, and by these to determine in what years the growth was normal, in what years below normal and in what years above normal, and the defendant contends by this class of evidence that it demonstrates that the growth for the past several years has been normal or at least better than in many years preceding, and that therefore there can not have been injury to the trees.

They have also introduced certain portions of sections from the trunks of trees for the same purpose. (Evidence, p. 927.)

It is shown, by Dr. Hedgecock, Johnson and Clark, the employes of the bureau of forestry of the United States, that cores and portions of sections, do not constitute the best method for showing this annual growth as it is possible for a tree to grow more on one side than on another and for the rings not to be uniform all around the tree. Not only is this possible, but it is the rule. These witnesses show that the best method is to take an entire cross section of a tree where the entire growth and the entire annual ring can be observed, from this entire section to determine the annual growths, the growth checks and to say in what year or years the growth has been normal. (Evidence, pp. 444, 431-32-57.)

The state has pursued this method and has introduced a number of entire cross sections of the trunks of trees and these sections show that there is no uniformity of growth around the entire circumference of the tree and that the growth checks for the last few years have been in many cases severe, this condition being due to injury caused by smelter fumes. (Evidence, pp. 400-404), showing conclusively that the damage complained of by the State has not been eliminated and the nuisance not abated.

Prof. Bain, a botanist and entomologist was also introduced by the defendant (Evidence, p. 891), but his evidence is of no value to them for it is negative, as is that of every other of defendant's witnesses as to actual damage and he merely discusses scientifically and at great length the effect of fumes on trees, etc., introduces a number of photographs and shows that there are many sections of the country with much more dead timber in the forests than those of North Georgia. This sort of evidence is simply in the effort to becloud the real issue.

Prof. Bain admitted, however, that the leaves were the most

vital and important parts of the tree and that injury to them quickly made itself perceptible in the tree and that the leaves are the lungs, mouth, and stomach of the tree and take in and digest the food which builds it and necessarily where injury to them occurs, damage to the tree results, and he shows conclusively that application of sulphur dioxide is injurious to plant life. (Evidence, pp. 947-948-949-950.) And since sulphur dioxide is present in the air of Georgia, as shown by all the witnesses for the State, coming from the defendant's plant, as shown by Dr. Hedgecock and a vast number of other witnesses who have personally observed it, settling upon the trees and growing things, it necessarily follows that the defendant is injuring and damaging the State of Georgia at the present time.

The defendant has contended by a number of witnesses that the damage in North Georgia is principally caused by insects, but Prof. Bain testifies that he has "seen more damage by insects in other sections than here." (Evidence, p. 954.)

Along the line of scientific evidence, the defendant has attempted to show by hypothetical questions propounded to "experts" that the smoke rising from the stack of its plant of a given percentage of sulphur dioxide, this percentage being given by Lamoreaux, moving in a cone shape from the stack to the Georgia line widening as it came, of relative uniform width for its entire length, would be so diluted and difused by the time it reached Georgia, that it could not be injurious. (Evidence, pp. 824-25, 837-838.)

This evidence is set at nought by the testimony of the witnesses who swear that they have observed it on many occasions and that the smoke does not travel in the manner described in the hypothetical questions, and that the facts therein stated are not correct. (Evidence, pp. 8, 9, 17, 18.)

The answer to these questions are therefore valueless.

Dr. Hedgecock says, "I have seen it carry 25 miles, and when it got 25 miles away, it would strike the mountain," page 18.

The defendant has offered a vast amount of irrelevant evidence on the subject of damage existing prior to 1906, to which the attention of the court has been heretofore called.

The attention of the court is respectfully directed to the cross-examination by the defendant of the witnesses Will H. Shippen and Frank E. Shippen, introduced by the complainant. (Evidence, beginning pp. 405 and 501.) The defendant's counsel seemed to be endeavoring to develop evidence for use in a civil case then pending between the Shippens and others in the Georgia courts and such evidence is in no way relevant to this issue. A number of documents of great length were read into the record for no purpose whatever in this issue. If there was any purpose it seemed to be to show that the Shippens were interested personally in the outcome of the present issue, that they had caused the State of Georgia to begin and maintain this action, and that had it not been for them it would not have been begun. All such efforts are attacks upon the motive of the State of Georgia, and should not be considered by the court. The defendant consumed from pages 501 to 556 of the Evidence, in cross-examination of this nature.

Naturally the two Shippens are interested in this matter and being the owners of vast tracts of timber and land are as much or more interested than any other persons. But is this interest to be held against them, when their property is at stake? Should their interest be held against the integrity and honesty of the State of Georgia and her authorities in maintaining this action? Every citizen in the affected section of North Georgia is interested and it is not for the Shippens and not for any other individual or individuals that the State is proceeding, but for the protection of her rights as a sovereign and her sovereign ownership of the damaged territory, and for the protection of this great body of her citizens.

Any action at law or in equity, any trade pending between the Shippens and any other parties is, we submit clearly irrelevant to this issue.

It is virtually conceded by this defendant and is admitted by the Tennessee Copper Company in its contract with the State of Georgia and heretofore referred to, of file in this case, that there is damage being done in North Georgia. The Tennessee Company agrees in that contract to furnish a sum of money each year to be distributed by the State to its damaged citizens. But this distribution of funds is the least concession made by the Tennessee Company. It agrees to curtail its operations during certain months and above all agrees to allow a man appointed by the State to supervise its operations at its expense, to keep its books and plant open to him at all times and to allow the fullest examination by the State. The Ducktown Company does not do this but endeavors to hide its own actions behind the Tennessee Company and says that the damage is being done by that Company and not by it. It does not come out in a fair and open manner and say to the court "here are our records, examine them," but keeps them out of sight and allows no inkling of its true operations to creep into the record in this case. The presumption arises that the Tennessee Company is living up to its contract, because the State has not moved against it and allows a continuance of the contract, and it necessarily follows therefore, that the present defendant is the source of all damage now being done. Not only does this follow as a necessary conclusion, but as heretofore pointed out it is shown by a number of witnesses that during certain periods when the Tennessee Company was closed down, damage was done in North Georgia, and this smoke carrying the deadly fumes could only come from the plant of this defendant.

It is shown by the State that the zones of injury marked on a map by Patterson, Government Expert, filed in the original hearing in this case, have been increased since Mr. Patterson made such investigation and map, and that the two principal

zones have considerably widened and the extent of the injury is much greater than in 1906. (Evidence, pp. 366, 367, 326, 327-28, 443, 444.)

The map by Patterson is filed in this hearing as Exhibit A to the evidence of W. H. Shippen. (Evidence, p. 328.) The two zones which are here shown to have widened are the accute and chronic.

This evidence alone demonstrates that beyond question the conditions now existing in North Georgia are not improved as the defendant has undertaken to prove, but are considerably worse, and that the territory of Georgia affected by the fumes from the smelters is much larger in area than in 1906 when this Court held that Georgia was entitled to relief.

The defendant introduced a number of witnesses who testified that in the section of North Georgia claimed to be damaged by fumes, there were crops raised, which had never been equalled not only in that section but anywhere else in the state; prize acres of corn, marvelous yields of wheat and oats. And in cross examination of the witnesses for the State they endeavored to show that the very years during which they claim those extraordinary crops were raised, had been the driest ever heard of in that vicinity, so dry in fact that all of the damage done there was attributed to drought by the defendant. It would not be possible for bumper crops to be raised in various locations through the same section when the entire section was visited by unheard of drought; but it is not only possible but is the fact that good crops can be raised on one farm which is untouched by sulphurous gases while the next farm might be entirely blighted by the fumes.

One witness introduced by the defendant to show the magnificient yield of the land in North Georgia,—that same land they

claim in other parts of their evidence to be worthless,—was John Addington (Evidence, p. 878), a farmer of Fannin County who won the first prize at a local corn "show" for the largest yield per acre. He had planted one acre in prize corn and had devoted himself almost continuously and exclusively to this acre. He had forced his land, and lavished fertilizers upon it and had used the most improved methods of farming (Evidence, pp. 884-885), and had far surpassed the majority of farmers in his care and attention to that one acre, and the defendant relies upon this acre alone among the thousands and hundreds of thousands in North Georgia, to substantiate its claim that no damage is being done.

Addington testifies that his place has never been visited by the smelter "smoke" to any great extent, that it lies behind a ridge of hills which protects him and that he has never suffered greatly from it, not even in 1906 and 1907, but that he has seen his crops bitten to some extent by the fumes and in adjacent territory he has seen the forests where they have been visited and burned by the smelter smoke. (Evidence, pp. 880-881-882-887.)

Some of the witnesses on behalf of the defendant brought from Georgia are so eager to serve their employer that they swear positively that since the acid chambers were installed by the two defendants they have never seen smoke in Georgia to an appreciable extent. The Companies themselves do not contend this, for in the winter months they operate at full capacity and it is an admitted fact that when so operating their acid chambers cannot take care of all the fumes. The only exception made to this testimony of the witnesses just referred to is that there is occasionally smoke present when the Tennessee Company breaks down. (Evidence, 608.)

To illustrate the nature of the evidence given by the witnesses for the complainant, we quote from some of them as follows:

In speaking of the relative carrying power of the smoke from the plants of the two defendants, Dr. Hedgecock, on page 8 of the Evidence, says:

"Q. 40 Which would pass under and which would pass on top?

A. The Ducktown Company's smoke would pass below, the other on top.

Q. 41. Where would it strike the State of Georgia most?

A. It would strike lower down.

Q. 42. Where would it affect Georgia?

A. The effect would be greater the first few miles, affect it—

Q. 43. Affect it more or less than the Tennessee Copper Company?

A. It would affect it more on the first slopes.

Q. 44. What distance would that injury carry?

A. From my observation from the smoke columns I have seen, I would judge it would carry out six or eight or ten miles, depending on the conditions; it might go further."

Regarding injury which he saw, the same witness says, on page 9:

"Q. 61. On that trip did you observe any smoke injury, if so, at what point?

A. On that trip I observed smoke injury near Epworth, and extending at various points along the road from Epworth to Madola and beyond Madola at a number of points between there and Barnes Mountain, and on Barnes Mountain abundant injury, and I took the field glasses and looked at Mule Top and could see many trees browned on the slope of Mule Top Mountain. Returning from there to the Grannymar Mountain, I saw injury in several places."

"Q. 63. Was there much or little injury through that section?

A. Much injury in places, not uniform."

Further in speaking of this section, the same witness said, on page 16, in reply to question 101:

"I would attribute the greater part to the Ducktown plant and a minor part to the Copper Hill plant, until you get high up on the mountains, when you get on top of the mountains, it would be hard to say, on the high mountains."

H. L. Johnson, government forester, in speaking of a trip he made with Dr. Hedgecock and others in reference to smelter injury in the Madola and Barnes Mountain sections says on page 60:

"A. to Q. 20. Well, the foliage for several miles was so brown and red,—we passed one place where some scarlet oak had shed at least two thirds of the leaves, and the leaves covered the ground in the road under the trees."

E. B. Clark, another government forester, on page 315, says:

"Q. 113. Tell me one place where it has affected the underbrush?

A. All around Pierceville and Madola.

Q. 114. When did you notice that?

A. Last Friday and Saturday.

Q. 115. How many acres of underbrush where you noticed the underbrush was affected?

A. Hundreds of acres.

Q. 116. Did you get out and travel around and go on hundreds of acres to see it?

A. I walked through hundreds of acres."

The above questions and answers were on cross-examination. The same witness in speaking of the two volumes of smoke coming out of the two stacks of the defendants when standing on Barnes Mountain, stated on page 305:

"Q. 43. The stacks of both plants were visible?

A. Yes sir.

Q. 44. State whether or not you saw any smoke coming out of the plants?

A. Yes sir, large volumes.

Q. 45. What was the volume coming out of the Tennessee Copper Company's stack, as compared with the volume coming out of the other?

A. Both about the same."

J. H. Clonts, telling of the conditions in his neighborhood, east of Ellijay, in Gilmer County, on page 80, says: Answering Q. 11. "This smoke in there is what they call the Ducktown smoke. When the wind comes in from the north it comes towards us; comes rolling in

there like the woods was afire and comes in and drops in your fields, and when it comes over and drops in there you can smell it. After it comes in there, in a day or two you can see it on the leaves of the trees; dries up the leaves."

On page 82 the same witness in answer to Q. 50, says: "It has been in there more this year than it has been before; it seems like the wind comes from the north more, and when it does, it comes in there. I wouldn't say that it comes in every day; I think there were some of the days that it went back north."

On cross examination this same witness on page 85 says: "Q. 37. Wasn't the smoke worse in 1906, 1907 and 1908, just after that stack was constructed than any other time, for two or three years, than it has ever been?

A. No, I don't believe that. This year it has hurt us worse than any year."

C. S. Northcut on page 99 says in answer to question 21: "The first day I saw it, I was sitting on the porch at home. It come up the branch. I first thought the woods was on fire or some building on fire down below and when I come to notice it, it was the smoke that comes in there when the wind was from the north, and we had a north wind blowing that day."

On page 101, the same witness says answering Q. 55: "After the smoke come in there, the taters died down; just looked like a fire had been through them."

W. A. Painter, on page 107 in answer to Q. 15 says: "One year it was as bad as this year, but it was later in the season; that was about six years ago."

On page 109, in answer to Q. 36, the same witness says: "I have seen it rolling through there like a fog, but it wasn't a fog, for I know the smoke."

W. S. Henson, on page 116, answering Q. 20, says: "I can't tell you sir which was the worse. It has been in there every year, but it seems like it has been worse this year than before."

George Henson, on page 119, says:

Q. 35. "What effect does it have on peas, if you know?

A. I have quit planting peas.

Q. 36. Why?

A. It just killed the peas so bad that I quit.

Q. 37. Didn't have any success with them?

A. No sir.

Q. 38. How about oats, rye and wheat?

A. I ain't sowed any oats; I sowed some wheat, and my wheat this year, after that smoke come down in there, I told the boys——it just dried up and parched it.

Q. 40. What was the yield from that particular field that this smoke settled on?

A. How much did I make you mean?

Q. 41. Yes, how was the yield from that field?

A. I sowed fourteen bushels and I got thirty-one.

Q. 42. How many bushels could you get ordinarily?

A. I don't know exactly, I reckon about twenty bushels to the acre. I sowed about fourteen acres and I only got thirty-one bushels from the fourteen acres."

W. H. Shippen, in answer to Q. 22, on page 320, says: "It is very much changed, the timber don't have that healthy look. If you start at the furnaces at Ducktown you can take a zone there, practically everything is denuded, you can go a little further out and you will find timber showing the effects of these fumes. You go a little further and you find the timber not so much affected. Still further you will find the leaves brown, and further out you will find only certain species that are affected by the fumes, and when you get beyond that you will find only an occasional tree, and when you get back thirty or forty miles, you will often find only one or two species on the hillsides where the smoke gets to it. As you travel towards the mines conditions get worse and as you go away they get better. The forests are unhealthy and—sickly condition. If you cut into the tree you will find the growth has been decreased and if you interfere with the growth of a tree it will die."

On page 325, this witness in answer to question 63, says: "I have been out in Georgia in the woods quite a little of late, and from what I have seen around Ellijay, I have seen so many times—I have seen the smoke present this year more than I have ever known it before. I have never seen the smoke with us as often. It commenced in the early spring and has kept up all this summer. I have seen vegetation and seen beans and peas damaged and killed on my place there in a single night.

I have smelled the fumes in there the night before and the next morning they would all be crisped up and ruined, as if frost had bit it and damaged it. I will not raise one third of a crop."

In answer to Q. 68, on page 325, this witness says: "I have noticed the large rye fields right in front of my home. I live up on the mountain and this rye field is in the valley right in front of me. I saw the smoke settle in on it just about the time the rye was in bloom, I was sure then that the rye would be just about ruined. A short while ago the rye—. When cutting that rye I went there and examined it as they were putting it up. The heads were large but they were chaffy and didn't have three grains where there ought to have been twenty-five or thirty. I don't believe the man got his seed back. I am sure that rye crop was cut off four-fifths from what it would be if the smoke had not got in on it. The same was true in my rye that matured in the chicken runs. The straw grew up almost to my shoulders, stood away up, but it didn't have any rye to speak of at all. I particularly noticed the roasting ears at my place."

This same witness on page 337, speaking of how the smoke affects one section one year and another another, in answer to Q. 108, says:

"Why, in some sections of the country it has been better and in some sections it has been worse. If you could follow those fumes during the entire time you could see how that was. It does not damage Blue Ridge one year and the next year maybe it will, you don't know where it is going, and for that reason you cannot absolutely state just the conditions with respect to what it is today and what it was last year or the year before."

The same witness, on page 339, on cross examination, says:

"Q. 135. Are you going to swear that taken as a whole the conditions in North Georgia are just as bad since the acid is being extracted as before?

A. Well I have always sworn, I have sworn, that conditions at Ellijay, in Gilmer County, Georgia, where I now live, for smoke, has been with us more, oftener, and in greater quantities this year than ever before in my life."

F. E. Shippen, on page 395, gives a number of dates, on which days he testifies that the smoke from the defendant's smelter was present in the Ellijay valley in sufficient quantities to do serious damage. The witness gives at least fifty days on which this condition existed.

The same witness, on page 399, in answer to question 49, says: "Last year we had a great deal of smoke, but our injury this year was earlier than I ever saw it before. There was serious injury there in June."

In speaking of the conditions in the Tumbling Creek Section, this same witness, on page 403, in answer to Q. 101, says: "The conditions were bad, the white pine and hemlock timber, a great deal was dead, and a great deal had just recently died. I examined the trees to see whether or not there had been any fire through any of the woods."

In speaking of the damage on Barnes Mountain, and Grannymar Mountain, which points are from eight to ten miles due south of the defendant's smelter, this

same witness says in answer to Q. 89, on page 402: "Why, the oak timber was the principal timber on that mountain, I would say that there was dead and damaged timber which I don't think would put out again, from looking at it, I would think something like forty per cent of the oak timber on that mountain will never put out again. I saw it there at Mr. Barnes' house and went up from there. I cannot tell you how long we were on that mountain, but I know what time the photographs were taken."

Answering Q. 90 on the same page, he says as to the appearance of the leaves on the trees:

"They were very brown, some of them were hanging on and a great many were on the ground."

With reference to the same section of country, in answer to Q. 126, page 405, he says:

"Why, on certain oaks, what we call Spanish oaks, some call it scarlet oak, and black oak, thirty-five per cent of the timber was dead, badly damaged and dying. I saw no fire injury to this timber. We climber up the mountain and went up near to the top and then we went down and to another top and then over it and went over in the Tumbling Creek country, if I remember right, I have it down here, yes we went on Grannymar Knob and crossed it and went on down Tumbling Creek quite a ways."

Dr. G. W. Hedgecock, on page 443, in speaking of the injured zones as fixed by the government forester, Patterson, on his map which is exhibit A to W. H. Shippen's evidence, was asked the following question·

Q. 23. "From all your trips to this section I will ask you to state, and from your familiarity with the zones

as fixed by the forest service, I will ask you to state whether or not there has been any diminution or retardation or restriction rather of the zones since 1906 and 1907?

A. All the points I have visited was none, in fact in one direction there was an increase to the west.

Q. 24. And in other directions?

A. It is about the same so far as I can see from what was described, in this area."

On page 231, L. C. Allen, who is 78 years of age, and who shows himself to be a very intelligent man, says in answer to Q. 24:

"To give you an idea of it; I am down there, and it's over twelve miles on the direct line from my house to Copper Hill and I live right there near the river, and when the smoke comes in there it strikes me right square, and when the heavy smoke comes in there I am right in the face of it. I have seen it so thick through there that you couldn't tell a man from a woman four hundred yards away."

This same witness on the same page, in answer to Q. 19, says: "The first, second and third of July and the fourth of July and especially the second and third of July was the heaviest smoke I ever seen in there."

This witness lives in the Morganton neighborhood. (Evidence, p. 230.)

T. R. Harkins, on page 239, says on cross-examination, in answer to Q. 8:

"Last year was our worst year that we have had; that is to say in my country."

A. E. Sharp, in speaking of the conditions from eight to ten miles south of the defendant's smelter, on Fighting Town Creek, on page 140, says:

"Q. 95. Was there much or little smoke damage in there?

A. I saw a great deal of it."

"Q. 97. How many trees would you estimate you saw damaged in there on that trip?

A. That would be impossible to tell; there was some appreciable damage on nearly all of them. I will say the bigger half of them.

Q. 98. How many miles of territory in Fannin County, Georgia, did that cover?

A. It must have been something like, where we traveled, eight or ten miles north and south.

Q. 99. How much east and west?

A. I saw the smoke as far as I went; I would say from four to five miles."

In answer to Q. 107, on the same page, speaking of the conditions in that section, the witness said:

"In that section there it killed the potatoes, a great many of them. I think in that section it killed pretty much all of them, and then on the timber you can see the leaves have turned white and then brown like you would see about in other sections. Back east of Ellijay it is worse than back west."

On page 142 the same witness says in answer to Q. 128: "Yes sir; there are some localities where it is a great deal worse than in others; they have it worse some years than other years. It depends on the air currents. Sometimes we will have them from the same direction for a whole summer; then the smoke will go in some sections and settle down, and maybe right in the center you will find some not damaged."

On page 143, in answer to Q. 146, the same witness testifies: "It kills it. I have seen the cabbages killed, and the peas, it kills them every year; and potatoes, it kills them too. In all sections we will find that they can't raise any potatoes to amount to anything. We can't raise peas at all."

We have given these few extracts from the testimony of various witnesses introduced by the complainant as typical of the statements of all these farmers and timber men, who as before stated spend their daily lives among the conditions complained of. It would be useless to quote further as there are hundreds and hundreds of such statements by the various witnesses for the State, set out in full in the transcript of the evidence.

We respectfully submit that it is to such witnesses as these that the court should look in determining this issue, rather than to all the expert testimony, all the scientific opinions and experiments and all the photographs.

Except such as this latter, the only class of evidence introduced by the defendant is the testimony of some few negative witnesses, the vast majority of whom were members of "commissions," who visited the affected territory, as Prof. Bain and others did, in the fall of the year, the winter or early spring, before the plants were in full foliage and before the effect of the fumes could be noticed.

We suppose there are many men in North Georgia and in Fannin and Gilmer Counties, who could truthfully testify that there is not and never has been damage in their particular localities, as many of the defendant's witnesses do, but this is not proof of the fact that the injury exists, because there can be no argument on the proposition that the sulphur dioxide is not uniform in its descent to earth but skips over large sections, and in between descends and withers, blights and kills, and the witnesses introduced by the complainant point out to the court the vast sections that are "in between" the localities in which the defendant's witnesses say there is no damage.

It is a fact that on all the mountain ranges in the affected district, on the sides facing the plants of the defendants the damage is more uniform and almost the entire section of such sides is seriously injured and damaged. (Evidence, p. .)

The State submits that the defendant herein has assumed the burden of proof, as heretofore stated, and that they have signally failed to carry such burden. We submit that all of the evidence shows conclusively that conditions in Georgia have not only not improved but that they were worse during the summer of 1914 than ever before.

This being true, the State now asks that she be awarded the final decree of injunction which this court has held she was entitled to. She has acted towards the defendant with the greatest consideration and patience. She has delayed and delayed action which would be hurtful to the Company's interests. She has given it every opportunity to deal fairly with her and to abate the nuisance which is ruining the northern section of the State. But her patience has been exhausted; her delays have not been rewarded, her hopes and expectations, based upon the fair representations of the defendant have not been realized; the defendant has refused to treat with the State in the matter of an agreement; it has kept hidden its books and figures; it has dis-

regarded every right of the State and her citizens, and has continued its wrong doing to such an extent that at last the State can remain no longer silent, but comes in justice to herself and her citizens, and in defense of her sovereign ownership of her lands and prays this Honorable Court to grant her relief and to issue the final decree which will restore her to safety and her citizens to peace and happiness.

Respectfully submitted,

WARREN GRICE,

Solicitor.

J. A. DRAKE.

LAMAR HILL,

of Counsel.